Periodical

JANUARY, 1945 VOL. 34, No. 1

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INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

The Shop Teachers' Professional Magazine

/R v.34 1945

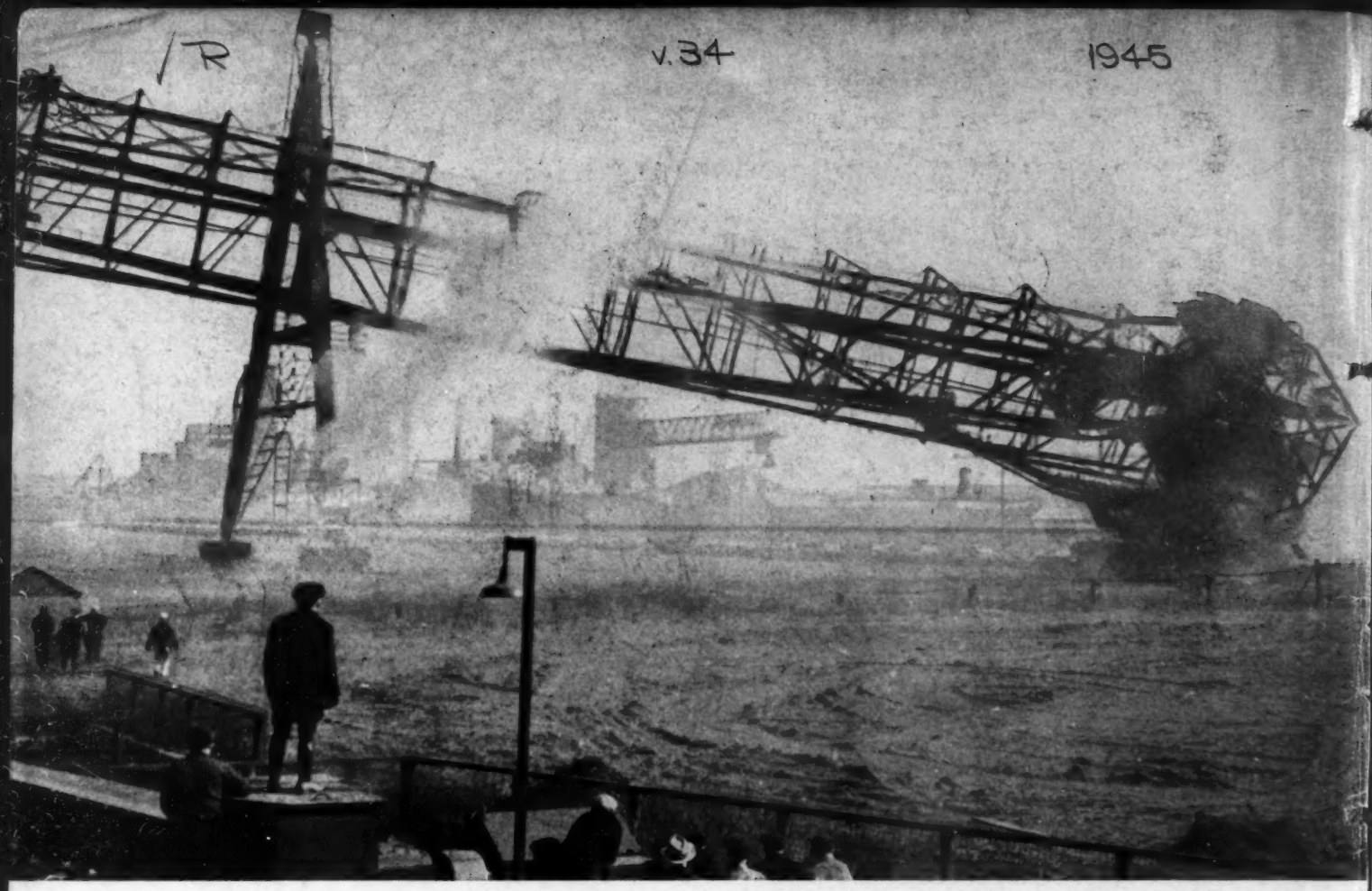

PHOTO COURTESY SCIENTIFIC AMERICAN

WHEN IT IS CORRECTLY IGNITED...

If you will take a little powdered aluminum and a little powdered iron oxide and mix these commonplace substances together, you are ready to do several startling things. You can fuse the supports of an ore bridge and cause its quick collapse as in the demolition photograph shown above. Or you can weld, repair and rebuild broken and worn machinery parts right on the job. There is a proviso, of course. The mixture will ignite only at 2400 degrees and you must have the correct ignition powder to produce this critical temperature.

All of which has a familiar ring to educators who work with the common clay of humanity in their classrooms to fashion the future of our country There is a critical moment in the life of every boy when he is warmed by interest in the new and it is possible to kindle a flame and heat of aspiration within him such that the boy begins to mobilize his forces and abilities and drive toward a goal hitherto beyond his reach. Remember, America did not have to *breed* its heroes for the war.

Instructors in mechanical drafting know the secret well. They know how important it is to capture the interest of a boy when he first comes to drafting class . . . how to add fuel to the flame thus kindled . how to make the boy see what men have done, to realize he too can set his ambition high, he too has only to work collectedly, intensely, persistently toward his goal. And shall the very instruments of this important work be less than important? Shall they be inferior and thus contradict all that the instructor tries to show by precept and example? Or shall these drafting instruments be superior, giving their owner the pride of possession, the sense and example of fine workmanship, a subtle reminder that gives the boy renewed strength every time he touches them?

Here is an opportunity to ignite the flame which no conscientious instructor will toss away . . but will seize and exploit by insisting that the boy's drafting instruments be the finest the lad can afford. So much depends on so little extra cost

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ARMY E NAVY

Army-Navy "E" Production Award for Excellence in Manufacturing, Drafting and Surveying Instruments and Supplies for the Armed Services of the United States.

BE READY FOR THE VETERANS WHEN THEY RETURN

The responsibility of training countless thousands of returning veterans for peace-time jobs will create new problems for our schools.

Industrial reconversion is already placing strong emphasis on better machining methods and the replacement of inefficient machine tools. Advances in production processes will require new workers having greater skill attained through extensive training programs. This means that your courses will have to match the progress being made by industry if these veterans are going to be adequately trained for their jobs. Obviously, obsolete shop equipment can only be detrimental to an efficient training program.

By equipping your shop with new South Bend Lathes you will be doing your training on the same lathes that are so widely used in metal working industries and service trades. They will also help you develop effective shop courses by simplifying the instruction of new techniques through their versatility and precision.

WRITE FOR NEW CATALOG 100-D

Illustrated in full color—showing all types and sizes of South Bend Lathes—Engine, Toolroom, and Precision Turret Lathes. Ask also for Circular No. 21-D, describing various training helps available.

SOUTH BEND LATHE WORKS

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Normally, a person obtains plenty of oxygen by breathing air. But following bomb blasts, shock from battle wounds, heart attacks, during severe cases of pneumonia, and after major operations, additional quantities of oxygen may be prescribed. The treatment is known as oxygen therapy.

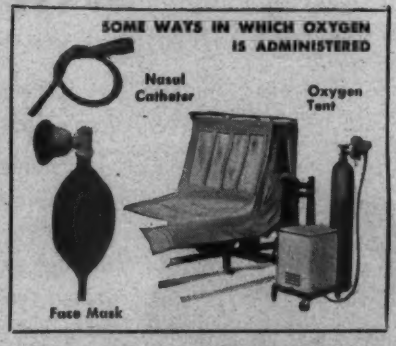
The breathing of extra oxygen also is required by all flyers in the rarefied atmosphere of high altitudes. The study of this use is contributing important data to that which the medical profession's continuing research has made available on the clinical use of oxygen.

The LINDE AIR PRODUCTS COMPANY, a Unit of UCC, is devoted to the production of oxygen. Every cylinder of Linde Oxygen, even Linde Oxygen for industry, conforms to the purity standards of the United States Pharmacopoeia—and is therefore suitable for human consumption.

▼

Oxygen therapy, once used as a last resort, is now routine early treatment. It should be welcomed by patient and family as an oxygen mask is welcomed by a flyer.

Civilian and military physicians and nurses and others are invited to send for booklet K-1, "Oxygen Therapy Handbook" which describes generally the types of equipment with which oxygen is administered.



IN AN EMERGENCY Linde Oxygen U.S.P. can be obtained from garages, welding shops and industrial plants.

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IMPORTANT: All U.S.P. oxygen must undergo extra drying procedures before it can be used for high altitude flying.

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SKILLFUL HANDS FOR POST-WAR AMERICA

Whatever the turn of events when the war is over one thing is certain. Vocational educators will have increased respect from the business community, and will be called upon for an educational job that exceeds even wartime demands. Not only will thousands of returning veterans want greater technical skills but millions of young students will want thorough and practical instruction to fit them for the great production era ahead. Atlas tools are particularly suited for that job. Their compactness, sturdiness, flexibility, low cost, operating safeguards—all combine to make them ideal instructional equipment. Send for latest catalogs to help you with your postwar plans.

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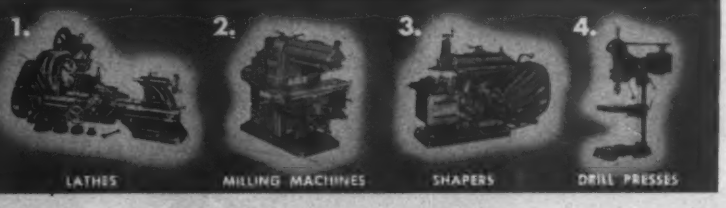
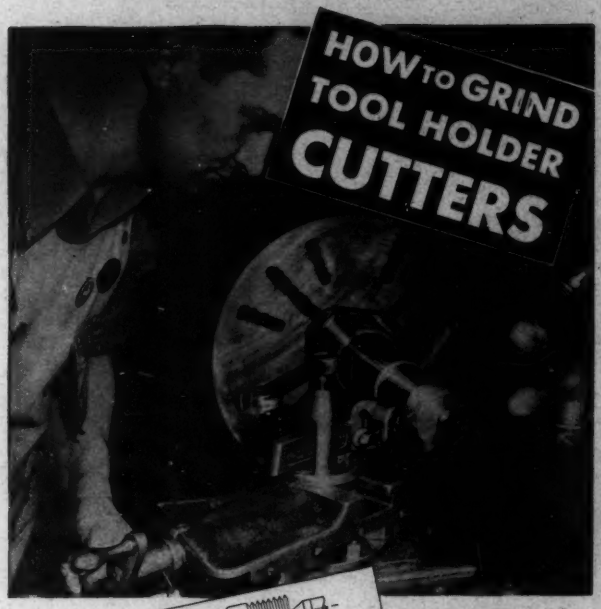
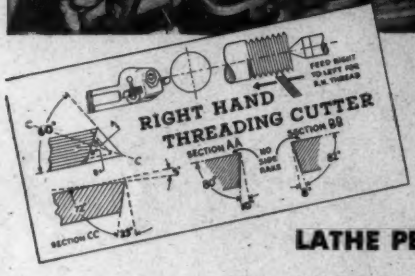
4 Atlas TOOL TEAM FOR SMALL-PARTS MACHINING







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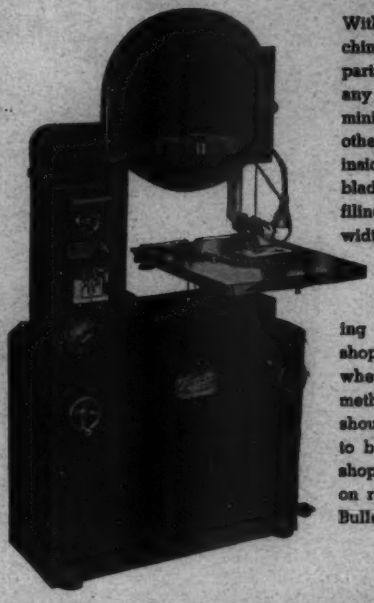

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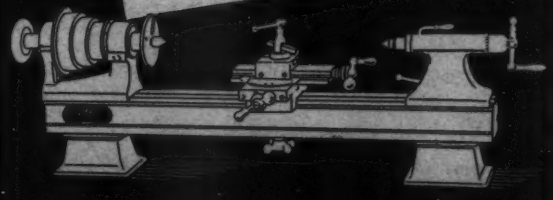

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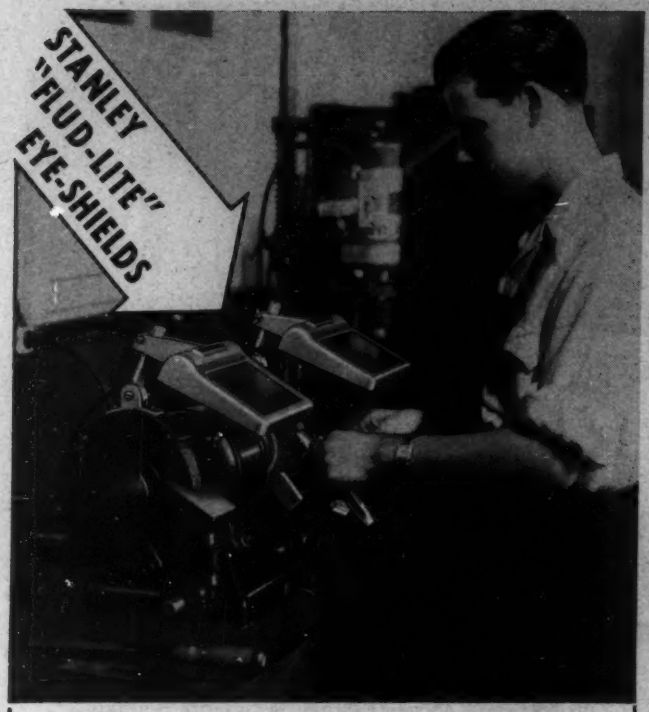

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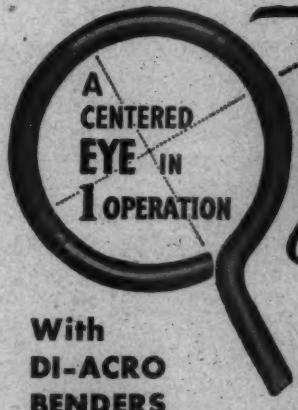

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Turn the page

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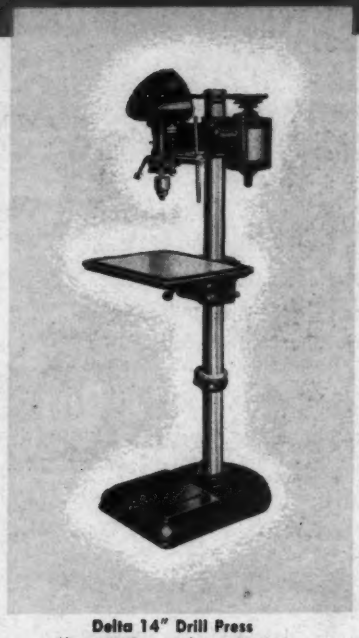

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(for metal, wood or plastics)

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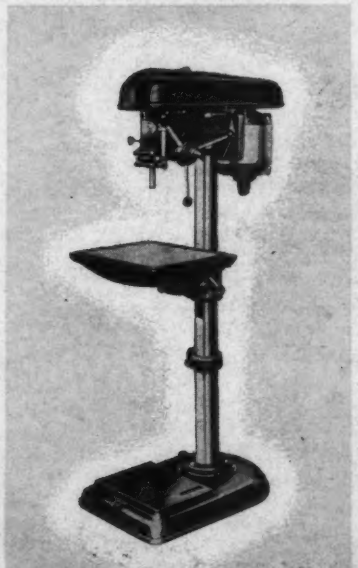

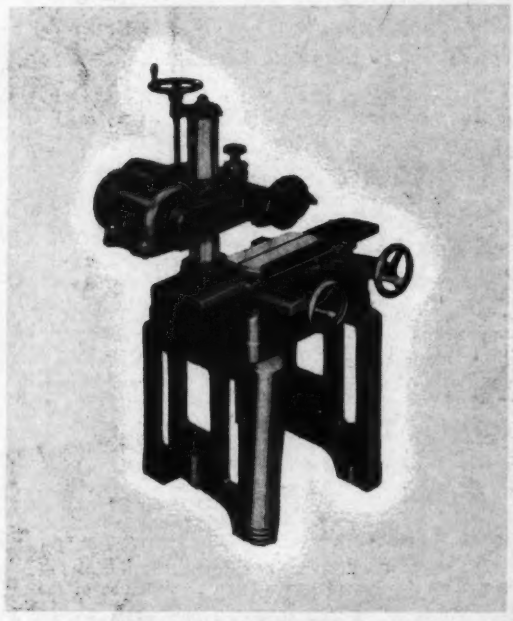

Delta Toolmaker Surface Grinder

Delta Industrial Grinder with Safety Shields

free! Send for your copy of "How to Plan A School Workshop" and also a catalog of low-cost Delta Machine Tools. Use the coupon at left.

Tear out coupon and mail today!

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- Delta Abrasive Belt Finishing Machine
- Delta Abrasive Disk Finishing Machine
- Delta 4-speed Scroll Saw
- Delta Heavy-Duty Shaper
- Delta 12" Woodworking Lathe
- Delta 14" Band Saw (wood-cutting or metal-cutting)
- Delta Cut-off Machine

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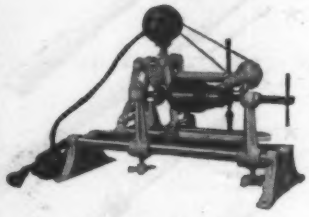

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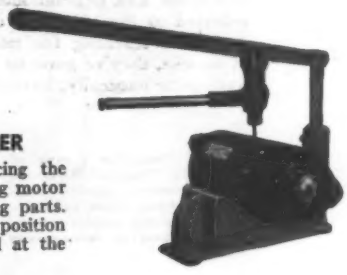

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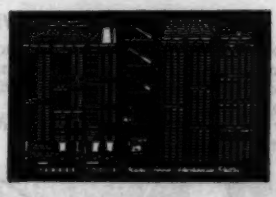

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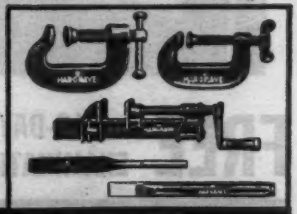

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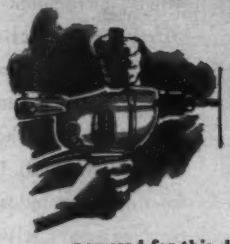

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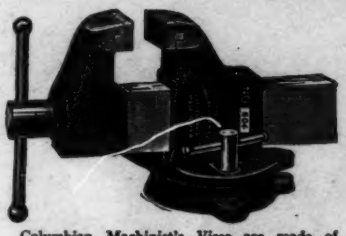

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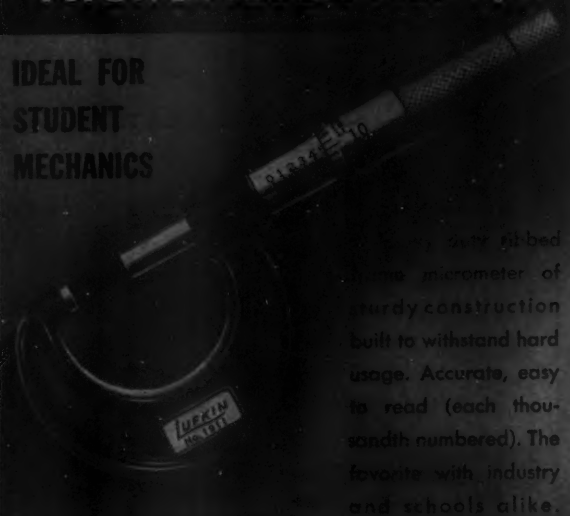

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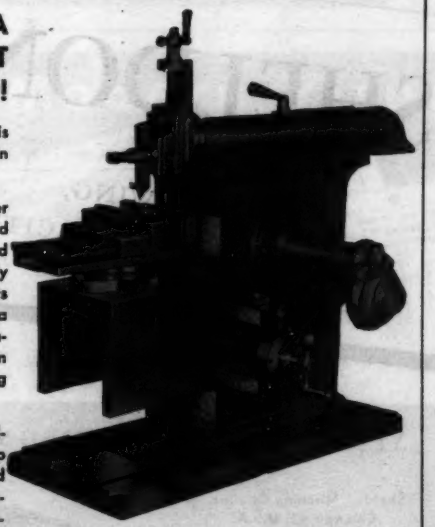

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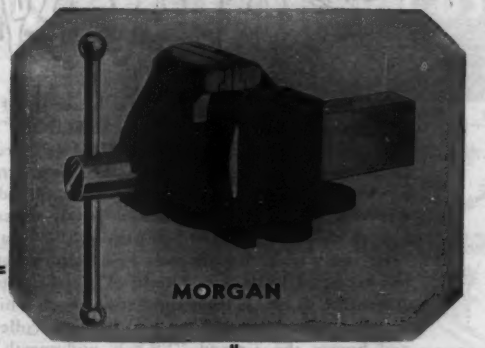

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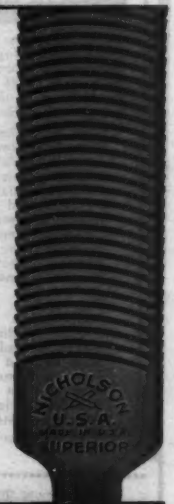

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VOL. 34, NO. 1 JANUARY, 1945

TABLE OF CONTENTS

The Future of Industrial Arts and Vocational Education, *Al. W. Meyn* 1
Newly Designed Tools for Supervisor Training, *Earl G. Planty* 2
The Job of Vocational Education, *Peter T. Shoeman* 4
Peacetime Vocational Placement Factors, *Earl M. Bowler* 5
The Conference Method in Vocational Education, *Murray Banks* 7
Editorials 9
The Consumer Looks at Industrial Arts, *Walter I. Shockey* 10
The Shopboy, *Leonard E. Schmidt* 10
A Cooperative Apprentice Program, *F. N. Newton, Jr.* 11
The Draftsman at War, *E. H. Cameron* 11
Discipline Is No Problem, *R. Randolph Karch* 14
From Trade to Profession, *Claude H. Ewing* 16
Streamlining Education, *H. T. Glenn* 17
Teaching Materials for Industrial Education, *Chris H. Groneman* 18

Problems and Projects

Soldering Copper Furnace, *C. F. Zaenglein* 22
Envelope Opener, *Isadore M. Fenn* 23
Handy Sewing Kit, *Isadore M. Fenn* 23
The Magna-Flux Unit, *Stanley J. Drazek* 24
Whittling-Jackknife Technique, *W. Ben Hunt* 25
A Correlation Project, *James E. Reagan* 26
The Fundamentals in Judging A House, *J. Edgar Ray* 27
Bronze-Powder Applicator, *L. Gaylerd Lindahl* 27
I Am A Cold Chisel, *Irma Bull* 28
Ornamental Tin Craft, *Chris H. Groneman* 28
Design for the Teacher of Industrial Arts, *Burl N. Osburn* 29
A Sandwich Tray, *Louis V. Newkirk* 31
A Good Salvaging Job 32
Photo Stencils for Silk Screen Press or Mimeograph, *W. Bruce Adams* 32
The Vacuum Gauge, *Edward V. Walters* 34
Cabinet Drawing, *W. W. Sturtevant* 36
Surplus Property Act 38
The Bicycle as A Class and Shop Project, *Roland C. Geist* 38
A Riveting Machine Made of Scrap Parts, *Paul Franco* 39
Dynamic Flag Stand, *Jos. J. Lukowitz* 40
Make Your Own Tool Checks, *H. W. Babcock* 40
Airplane Sheet-Metal Shop Practice, *M. D. Caffin* 42
Bedside Tabel, *Louis Barocci* 42

Personal News 22A
Association News 25A
News Notes 26A
Shop Equipment News 28A
New Publications 35A

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Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

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As We Enter 1945

It seems an anomaly to extend to our readers the season's greetings in the same column in which they are exhorted to buy War Bonds.

Unfortunately, the message of the first Christmas day — "Peace to men of good will" — seems to have lost its meaning in this war torn world. In spite of the sad condition surrounding mankind, may we wish you and hope for you that 1945 will be a brighter and better year.

Disposal of Government Owned Surpluses

- Ask your representative in Congress for a copy of the 1944 Surplus Property Act.
- Maintain contact with the regional office of surplus property serving your area to keep posted on the surpluses that are available. (See page 38 for a list of the regional offices.)
- Manufacturers and distributors of school goods can be of great help to you in the procurement of surplus property.

The February Issue

The end of the first semester of the school year 1944–45 seems still far away, but the need for preparing tests for the ending of that school period is becoming more and more of a reality right now. For that reason, the next issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will bring a number of tests to the reader so that they may assist him in preparing his own for the final mid-year grading period.

This Month's Cover

The cover picture for this month shows the overall assemblyline of a western aircraft plant. The wing of the front airplane reminds us of a duty and gives us a suggestion which everyone should follow.

Airplanes and munitions of many kinds will be needed in increasing quantities as the tempo of our European and Japanese invasions gathers momentum.

Be sure to buy that bond.

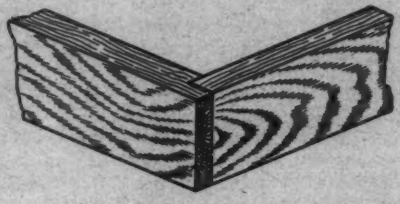
BUY THE BEST — THERE IS NO SUBSTITUTE FOR QUALITY

J-50

SHAPER

No. 5 of a Series

JOINTS AND THEIR USES



VARIATION OF THIS JOINT - BOTH PIECES ARE RECESSED

RABBET JOINT

In this commonly used joint one of the joining pieces is recessed on either the end or the edge to receive the other piece. Sometimes both pieces are recessed as shown above. This joint is most generally associated with the construction of drawers, in which case, the front is usually rabbeted to receive the side rails. It is also used in doors, window frames, furniture, in cabinet making, and in some types of boxes.

A common expression often heard in school shops is, "It's easy when you know how." Conversely you can get into much trouble when you don't know how. That is why Yates-American machines for school use are made exceptionally simple in design and easy to operate. In very little time students acquire the knack to run these machines skillfully and safely.

The J-50 Shaper shown here is designed for easy operation. The table is smoothly finished to permit unrestricted movement in free-hand shaping operations. It has a heavy rim to make it easy for the operator to clamp on forms and guides. The spindle is at a convenient distance from the front edge.

All the controls on this machine are located in a position readily accessible to the operator. A band-type brake is used to stop the spindle.

The sleeve-guard entirely surrounds the cutter and can be adjusted to expose only as much of the cutter as desired. On the front side of the guard is mounted an adjustable, spring-loaded holddown which holds the work firmly, and serves to complete the enclosure of the cutter.

In many schools this shaper is ordered with the adjustable fence and spring-loaded horizontal holddown, optional equipment, which greatly facilitites the work of taking a jointing cut.

YATES-AMERICAN MACHINE COMPANY • BELOIT, WISCONSIN

YATES-AMERICAN

The Future of Industrial Arts and Vocational Education

*Al W. Meyn**

The "sixty-four dollar question" as to the immediate future of industrial arts and vocational education has been suddenly thrust into the forefront of the minds of educators everywhere. What impetus the extensive war-training programs have added to the educational system causes some perplexing problems. The problem of a regression from or an advance beyond the present point of development is really the question at hand. The answer rests in the attitude assumed by school administrators; they alone can decide the pendulum's swing in either direction.

From a viewpoint of the accepted school administrators, regression seems to be the order. This idea stems from the usual academic background from which so many in authority spring. The nonsacrifice of so-called cultural subjects in the education of our young people is paramount to this type of educator. The fact that the *arts* make for complete living is a philosophy held by many known and respected leaders of education. Hutchins of Chicago is an example of this school of thought. From the viewpoint of the enthusiastic vocationalist — only foreward progress far beyond our present status is the order. This naturally stems from the objective type of pregmatic philosophy bound to dominate such educators.

The answer seems to lie at a point not exactly midway between the opposites but somewhere in the line of the upper degree of each. In other words regression as seen by one or progression as seen by the other may mean the same thing in the final analysis of the problem.

Education can be said to have proved its worth beyond doubt in our present situation, for it has produced youth that were so adaptable that we were able to change from peace to war almost overnight. Our educational system can be said to have failed, however, in that it allowed a war to start which required almost a complete overhauling of our present civilization to satisfactorily cope with the monster it permitted to grow. Such opposites indicate possible attitudes that can influence the program of practical education on the vocational or technical level and direct its immediate future. It is an opinion that a realistic philosophy should be arrived at so that our democratic society can best survive and be nurtured by our educational system. A sensible solution to the immediate future of the place of industrial arts and vocational education in our schools is therefore almost an imperative need.

Purely vocational education has not gone so far forward as is generally thought during the war period. True, some 6,000-000 men and women have been trained to a point of employment during the past four years of our intensive program. Those trained have been on practically all levels of abilities and positions, and made our increased production possible but the training in many instances was very thin and limited in scope. This type of training should not be confused with a well-rounded vocational program which is the essence of our practical system. Hence — the war-training programs lacked much of being what is generally thought of as well-balanced vocational or technical education.

The future of the industrial arts and vocational education programs in America can be considered from two angles — general education and specific education or job training. Both are important and should be analyzed. From our present knowledge of what our educational system should do for society we arrive at two definite conclusions. First, our nation is definitely the outstanding manufacturing country in history. Second, the cream of our youth should be so trained that this first ranking phase of our economy — manufacturing industry — can be served, continued, and further developed. These conclusions point out definitely what should be the future of practical arts education in America, both as part of general education and a larger portion of our specific educational program.

It seems evident that the immediate progress in this field of our educational program will rightfully be centered in that phase generally known as industrial arts. This broad subject should form a part of the training of every young person in America so that they may better understand our country and its most important activity. The broad study of the art of industry — and it is an art in America — leads us into all phases of desired educational subjects, history, mathematics, science, languages, and the like. When we offer such education, adequately for all in America, we can be said to approach our national need and the ultimate in education. In the field of industrial arts and vocational education, the regression movement so desired by academic educators would most probably result in the establishment of less specific and more general educational aims. Whether this is regression may be questioned, but it is, in essence, the most important forward step yet taken.

Vocational education will hold the position which it has assumed through the emergency programs. It has established the centers for doing specific types of job training and these will be continued due to the fact that they are in existence and available when needed. For some school systems this work represented a completely new activity. While enrollments will decline sharply the vocational programs will definitely advance because of the improved methods and procedures developed during the war-training days. The extensive use of motion pictures and slides in vocational training is an outstanding example and while progressive academic educators will claim a victory for visual aids in education, the vocational program will have advanced as a result of this acclaim. It is a proved fact that presentation of problems and ideas or methods can be brought to the forefront of understanding more easily by pictures than by the spoken word, and the impetus given by motion pictures to the teaching of actual functions makes this method of teaching more necessary than ever.

The answer to that "sixty-four dollar question" — what is the future of industrial arts and vocational education, can be summarized as follows: The only way industrial arts and vocational education can go is ahead, and while its progress may be looked upon by some merely as an inclusion into general education, it is, nevertheless, a definite progress. Industrial arts for all is the order of the day on the general education level. Vocational education, improved as it has been in method and facilities, will temporarily decline in total enrollments but adequately fed by increased activity in industrial-arts education will advance to a peak far beyond any present point in our conception.

*Washington, D. C.

Newly Designed Tools for Supervisor Training

*Earl G. Planty**

Present-day supervisor training programs are highly varied and individual in their content. This diversity is a healthy sign, indicating that specific programs are being developed to meet local needs.

To develop teaching materials, however, for the varied and technical units that are included in most programs lays a heavy burden on any training department. This load is made necessary by the absence of an exchange medium whereby teaching aids could be circulated among training directors. Consequently, many directors are spending time and money on the development of visual aids, conference outlines, course outlines, job sheets, problems, and case studies which have been admirably prepared elsewhere. The director of a National Defense Curriculum Laboratory says that we are all busy "rediscovering America," that is, laboriously originating instructional materials that are already in existence elsewhere. The writer pleads guilty to having wasted time and energy in this manner.

Recently, however, he has contacted all of our state departments of education and many of our best industries, and from them has solicited the material they have prepared for the training of supervisors.

Teaching aids obtained in this way have been helpful in:

1. Showing the scope and content of programs in different sections of the country and in other industries.
2. Providing illustrative teaching outlines and a great variety of content for individual conferences.
3. Giving examples of visual aids — charts, cartoons, and pictures.
4. Offering samples of pocket cards, graduation certificates, conference rating scales, etc.
5. Illustrating how teaching manuals, flyers, and work sheets are prepared.
6. Presenting a variety of training methods ranging from pure conference to complete lecture.
7. Describing the internal organization of various supervisor training programs.
8. Providing a wide variety of instructional tools, which with slight revision would be useful in any program.

The following annotated bibilography is offered, describing some of the best materials located. All have been obtained without charge from the sources listed.

Bulletins for Foremen

These bulletins for foremen are similar to the foremen's letters provided by some of the commercial services.

1. "Foreman's Bulletin," American Rolling Mill Co., Middletown, Ohio. Single-sheet foreman's letter, printed in two colors. Undated, probably issued monthly.

2. "Leader's Guide," Civilian Training Branch, Air Service Command, Middletown, Pa., 8 pp. A fortnightly leaflet circulated to foremen. Illustrated. Usually includes a case study, written in dramatic narrative form, involving foremen. Excerpt: placed beside an old and very English grandfather these lines, "Me Change the Baby?" — "Sure, if the baby's mother can learn to rivet steel pants on a bomber. . . ."

3. "Supervisor Training," Personnel and Training, Rome Air Service Command, Rome, N. Y. Four-page colored flyer, illustrated, sent to supervisors before they are called upon to attend classes. Attempts to describe program and create interest among foremen. A recruiting device.

Conference Reports

These well-known conference reports usually represent the edited minutes of actual group discussions.

1. "Foreman Conference Leadership Reports," Associated Industries of Wilmington, Ohio — Dept. of Voc. Ed., Teachers College, University of Cincinnati, Cincinnati, Ohio, 1943, 66 pp. Reports 15 conferences. Many conferences on psychological aspects of foremanship such as individual differences, personal maladjustment, rating scales, discipline, keeping men satisfied.

2. "Foreman Conference Leadership Reports," The Reynolds and Reynolds Company, Dayton, Ohio, The Dept. of Voc. Ed., Teachers College, University of Cincinnati, Cincinnati, Ohio, 1942, 58 pp. Sixteen conferences, ten of which are samples demonstrating conference leadership technique. Conference objectives stated and material well organized. Stresses instructional responsibilities of foremen.

3. "Foreman Conference Report," Aluminum Company of America, Phoenix, Ariz., Issued by State Department of Vocational Education, Phoenix, Ariz., 1944, 31 pp. Covers eight sessions. Four conferences on responsibilities of supervisors, absenteeism, characteristics of supervisors and unsafe practices are reported through lists of causes, effects, cautions, and solutions. Four other discussions on material control, training, safety, and rules and regulations were covered in talks by specialists, and so reported.

4. "Foreman Conference Report," Southwest Lumber Mills, Inc., McNary, Ariz., Issued by State Dept. of Voc. Ed., Phoenix, Ariz., 1944, 33 pp. Covers six conferences: Responsibilities of foremen, labor turnover, safety, cooperation, costs, incentive plans. Presents synopsis of talk given by specialist on each subject, followed by long lists of suggestions, chart style. Over 100 items in some lists.

5. "Instructor — Foreman Conference Reports," Associated Industries, Miamisburg, Ohio, Department of Vocational Education, Teachers College, University of Cincinnati, Cincinnati, Ohio, 1942, 55 pp. Sixteen conferences, half on problems of handling employees. Presents standard charts developed by group. Additions to usual conferences are sessions on Richards' Formula (rating), putting ideas across, and choosing men.

6. "Instructor-Foremen Conference Reports," Department of Vocational Education, Teachers College, University of Cincinnati, 1943, 36 pp. Reports 13 conferences. Some unusual titles: "How to Handle the Difficult Men," "How to Prevent Dissatisfaction," "Personality."

7. "Proceedings, C.C.C. Foreman Training Conference," Federal Security Agency, Civilian Conservation Corp., P.T. Series No. 20; Washington, D. C., May, 1940, 100 pp. First part deals with "How to Analyze a Problem." Thereafter problems such as housekeeping, discipline, cooperation, use of hand tools, etc., are analyzed and solutions reached. The last half of the booklet deals with the foreman as instructor. Conferences led by Frank Cushman. Includes good evaluation check sheet.

8. "Report of Foreman Training Conference," Conducted for Flight Test Foremen and Crew Leaders, Warner Robins Army Air Depot, Training Dept., Wellston, Ga., 1942, 22 pp. These reports are more representative of the instructor's teaching material than of conference members' contributions. Conferences on developing initiative, giving orders, correcting workers, etc.

9. "Report of Supervisory Training Conferences," Vocational Training for War Production Work, Adapted from a report prepared by the California State Department of Education, Distributed by Commonwealth of Pennsylvania, Department of Public Instruction, Harrisburg, Pa., December, 1943. (1) Release VT-UPW No. 3, 28 pp. Covers eight conferences. Women in industry, work planning, morale, discipline, grievances, etc. (2) VT-WPW No. 2, 39 pp. Similar to the foregoing but covers different subjects: Duties and responsibilities, industrial organization, evaluating and classifying workers, etc.

10. "Report on Supervisor's Training Conferences," Puget Sound Navy Yard, Training Office, 1942, 48 pp. Covers three conferences devoted to organization and administration, prevention of waste, and supervisor's problems. Discusses situations and lists causes and remedies.

Executive Training

This series of bulletins presents information helpful in training the upper levels of supervisors.

1. "Executive Development," Industrial Relations Manual, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., 1940. Three small leaflets. Part 9, Section 1, "Background of Production Organization," history of organizational patterns, "steps by which modern complicated industrial organization has come to what it is," 11 pp. Part 9, Section 2, "Development and Trends in Industrial Relations." Excellent summary of trends, 11 pp. Part 9, Section 4, "Policies and Responsibilities," covers foremen's responsibilities, 15 pp.

2. "Elements of Administrative Manage-

*Training Director, Johnson and Johnson, Makers of Hospital Supplies, New Brunswick, N. J.

ment" by William Toy, Reprint from U. S. Dept. of Agriculture Forest Service Bulletin, Reproduced by Utah State Board for Vocational Education, Salt Lake City, Utah, 1940, 55 pp. A digest of management principles, practices, and procedures; claims to eliminate abstractions and theory and to simplify literature and relate it to everyday jobs. Draws upon Fayol, Gulick, and Urwick. Seven chapters: the planning, organizing, commanding, co-ordinating, and controlling functions of management.

3. "Fundamentals of Supervision — General Motors Executive Training Program, Conference Leader's Manual," General Motors Institute, Detroit, Mich., 1940, 50 pp. Notes for conference leaders on topics listed in item which follows. Contains conference objectives, suggestions to leader, methods. Uses unusual chart method wherein a few simply stated principles are printed on large charts, displayed and discussed as the conference progresses.

4. "Manuals for Executives and Supervisors," Policyholders Service Bureau, Metropolitan Life Insurance Co., New York City, N. Y., 56 pp. Publication shows extent and use of manual for reporting company policies and procedures. Shows uses of manuals, content, methods of preparation.

5. "The Purpose and Objectives of an Organization, A General Motors Executive Training Program," General Motors Institute, Detroit, Mich., 1943, 50 pp. Notes for eight conferences; strong on cooperation. One unusual set of notes on obtaining cooperation through "The Planned Interview." Probably intended for distribution to conferees.

Human Relations

References listed here deal largely with industrial psychology, personality adjustment, and strategy in handling people.

1. "Complaints and Grievances, Supervisory Conference Material," Western Electric Company, Hawthorne Works, Training Department, Chicago, Ill., 1942, 106 pp. Summarizes now famous Hawthorne experiments. Considered by many the best available material on grievances. Several detailed case studies including analysis and treatment. Stresses social implications of grievances, shows their complexity. Helps look beyond symptoms to causes.

2. "Dealing With Human Problems in Industry," New Jersey Dept. of Pub. Inst., Voc. Div., Trenton, N. J., 1943, 36 pp. Eight chapters — variations in mental equipment, adjustments to environment, feelings, etc. Material written text book style. Prepared in loose-leaf form, given to conferees at conclusion of each meeting "to eliminate note taking."

3. "Problems of Handling People, Supervisory Personnel Development," Utah State Board for Vocational Education, Salt Lake City, Utah, 1944, 51 pp. Contains outlines for conference leaders on eight discussions: reprimanding, preventing grievances, cooperation, building confidence, etc. Teaching outlines contain conference objectives, lists of instructional materials, and presentation methods. Many cartoons used. Give-away cards developed similar to J.I.T. pocket card.

Training Conference Leaders

These references show how to lead conferences and how to train others to do so. They analyze group discussion as a teaching method.

1. "Conference Leader Training," California State Dept. of Education, Sacramento, Calif., 1943, 39 pp. Used to train men from war-production industries in methods of conference leadership. Describes five two-hour sessions. Covers duties of conference leaders, use of problem analysis charts, methods of winning group confidence, and minutes of practice conferences.

2. "Conference Leader Training Manual," New Jersey Department of Public Instruction, Trenton, N. J., 1943, 52 pp. Covers selection of conference leaders and techniques of leadership.

3. "Social Leadership," U. S. Office of Education, Vocational Division, 1940, 39 pp. Report of a course for college students. Develops ability to lead discussion groups. Course given at College of Puget Sound, Tacoma, Wash. Shows how useful conference methods can be even on college level.

4. "The Training of Foreman Conference Leaders," U. S. Office of Education, Washington, D. C., 1938, 119 pp. A most complete presentation. Source of material for many similar handbooks. Well organized.

Teaching Aids, Methods, and Program Descriptions

The references which follow include general information largely devoted to teaching aids, including background material for instructors and handouts for trainees.

1. "A Conference Summary for Foremanship," Industrial Service Bureau, New York State Dept. of Education, Albany, N. Y., 1942, 90 pp. Conference material for 41 discussions, includes record keeping, industrial economics, waste control, job analysis, and more common subjects. Conference outlines uniformly presented, introduction and statement of objectives for each conference, lists of benefits, uses, abuses, difficulties, methods, causes, factors involved, etc. Excellent lists.

2. "Conference Outlines and Work Sheets for Supervisor Training," Personnel and Training Division, Rome Air Service Command, Rome, N. Y., 1944, 100 pp. Detailed teaching outlines (lesson plans for conference leaders) for three courses of 28 conferences: Course One deals with Job Management; Course Two, Problems of Handling Employee; and Course Three, Job Instruction. Teaching outlines are accompanied by work sheets, problems, flyers, check sheets, and other learning exercises.

3. "Introduction to Supervision," Supervisory Training Text, Industrial Relations Branch, Training Department, Western Electric, Kearny, N. J., 1943, 64 pp. Sixteen sections including company policies, simple motion economy, vocational testing, labor relations, etc. Principles, charts, outlines, commandments, etc. Only material located dealing wholly with *introduction* to supervision.

4. "Supervisory Personnel Development," Book One, Conference Outlines, Utah State Board for Vocational Education, Division of Industrial Education, Salt Lake City, Utah, January, 1944, 17 pp. Very brief outlines of four courses, 27 conferences. Course titles: "Problems of Handling People," "The Supervisor as Instructor," "Job Methods," "Organization and Management of Production." Seven pages of useful cartoons. Reproduces four give-away cards similar to J.I.T. pocket cards.

5. "Training Supervisors and Keymen," Policyholders Service Bureau, Metropolitan Life Insurance Company, New York City, N. Y., undated, 45 pp. Covers purpose and methods of supervisor training, essentials of a successful program, choosing subjects for discussion, measuring results, planning a training program and short summaries of the supervisor training programs of eight industries. Gives over-all view of various training plans.

6. "Work Sheets for Use in Training Supervisors," Personnel Director, Johnson & Johnson, New Brunswick, N. J., 1944, 33 pp. Work sheets, problems, true-false practice exercises, case studies, conference summaries, and other learning exercises given to foremen for practice in learning and applying principles of supervision. Materials cover 22 conferences including: (1) inducting new workers; (2) developing initiative; (3) rating efficiency; (4) morale building; (5) industrial organization; (6) housekeeping.

Training Job Instructors

Bulletins included here are primarily useful for job instructors, shop teachers, and vestibule trainers or for those engaged in developing such persons.

1. "Job Instruction, A Manual for Shop Supervisors and Instructors," Training Department, Western Electric Company, Hawthorne Works, Chicago, Ill., 1940, 80 pp. Contains sections on Job Analysis, Planning the Instruction, Teaching the Job, Building Up Skill, The Learner's Difficulties, and Understanding the Learner. Good presentation, especially last two sections.

2. "Quartermaster Handbook, Methods of Teaching," Office of the Quartermaster General, The Military Training Division, Washington, D. C. Revised Edition, January, 1943, 92 pp. Aims to "provide army instructors with a nontechnical discussion of teaching methods." Sound in educational theory, beautifully printed in two colors, and well illustrated. Highly useful for training industrial teachers. Broader than J.I.T. Surpasses most standard teacher training texts.

3. "Supervisory Personnel Development, Job Training," Program A, Sections 1–5, Oregon State Board of Education, Division of Vocational Education, Salem, Ore., 1943, about 10 pages each section. Five well-organized booklets containing many adapted lists of suggestions for vocational instruction. With illustrations.

4. "Training Employees as Job Instructors," Policyholders Service Bureau, Metropolitan Life Insurance Company, New York City, N. Y., 36 pp. Reproduces much of the T.W.I. program. Includes in addition need for instructor training, results obtained, training objectives, etc.

Miscellaneous

These valuable materials do not fall in any of the major classifications above but are, nevertheless, most useful in dealing with a variety of unrelated problems.

1. "A Guide for Local Supervisors of Trade and Industrial Education in Colorado," State Board for Vocational Education, Denver, Colo., 1943, 28 pp. Lists duties and responsibilities of training supervisors. Also check list for scoring programs. Excellent reminder of extent of training responsibilities.

2. "Manual of Information, Development of Instructional Material for Job Instruction," Misc. 3506, VE-ND, Supplement No. 1, United States Office of Education, Washington, D. C., 1942, 19 pp. A guide to the organization and administration of instructional material development programs. Useful for development of instruction sheets. One of few publications on curriculum development.

3. "Place of the Foreman, or Supervisor, in an Industrial Organization Having a Collective Bargaining Agreement, A Manual for Conference Leaders," Maryland State Dept.

of Education, Baltimore, Md., 1943, 31 pp. Report of conferences at Fairchild Airation. Contains conference outlines, set of questions and answers on union contract.

4. "Supervisors I Like and Dislike," Personnel and Training Division, Ogden Air Service Command, Ogden, Utah, 1943, 49 pp. Employees' descriptions of supervisors they like best or dislike most, also tabulations of characteristics mentioned.

5. "Survey of Supervisor Training Program," Rome Air Service Command, Personnel and Training, Rome, N. Y., 1944, 16 pp. Philosophy, authority, and need for program which trained 3000 supervisors in nine months. Contains description of program, staff, size of groups, schedules, plans for advanced training, committees, etc.

6. "These Are Your Weapons," Plomb Tool Co., Los Angeles, Calif., 1943, 34 pp. "Fourteen Ways to Increase War Production" through methods, improvements, and suggestion systems. Beautifully printed, cleverly illustrated, and interestingly written.

These selected references represent thousands of hours of creative thought and writing produced at an equally great cost in dollars. They represent the best efforts of some of the outstanding supervisor training units in America, combining years of training experience. Time and travel limitations make it impossible to visit these programs firsthand. But reading about them is possible and also highly profitable for those who can learn from others' experiences. In writing for materials listed here, remember that the other fellow will be interested and helped if you include with your request something of your own development.

The Job of Vocational Education*

*Peter T. Shoeman***

Directors and teachers of vocational education are forever solving new problems. They were told to do that when the part-time schools were started. They were told to do it when the great depression made it necessary for our adult schools to become a haven of safety and security for the unemployed, who without the school would have been completely discouraged. They were told to do that when war suddenly struck us and it became necessary for some one to take all the available people and train them for war industries. And now there is descending upon them the great task of helping returning veterans and war workers to find permanent places for themselves in the productive life of some community.

The work that confronts vocational education right now is more interesting than anything we have ever done. We are being told constantly that we are entering a new world. It is to be hoped we *are* entering a new world — a world in which it is possible for every man, woman, and child in this nation to live in comfort, to have enough to eat and wear, and to have a home with all the conveniences which make for sanitary and healthy living.

There is no good reason why we should not have such a world.

In the past three years, under the pressure of war needs, we have made industrial advances probably faster than at any period of our history. With 13 millions or more of our population taken out of production, we have still produced enough civilian goods for the workers to live better than ever before and at the same time we have provided the 13 millions not only with goods for their own personal needs, but with the materials of war; and at the same time we have provided our allies with many of the materials *they* need.

Now, when the 13 millions come back, if we are intelligent, we can turn our new productive capacity into channels which will make these United States into a modern garden of Eden and a model for the rest of the world.

Will we be intelligent enough? Therein lies our job. Will we be able to do our share toward preparing the people of Wisconsin for this new world?

How can we prepare them for it? The first thing we have to think of, no doubt, is the immediate task of getting that 13 million now in our armed forces, back into the useful production of goods and services. This is important. It is a real job; a great job.

Judging from reports received by the Wisconsin State Board of Vocational and Adult Education, it seems that this great job is being approached in an intelligent way. We are recognizing that this is not a task of training great numbers rapidly to fit into mass production processes, but one that requires long and patient work with the *individual*, helping him to find some of the things he can do with most satisfaction to himself and most benefit to the community.

Probably the U. S. Employment service or interested friends will secure the first peace time employment for the returning soldier and war worker. Unless a period of depression and unemployment comes immediately after the war, or much sooner than we expect it, the finding of a job of some sort may not be difficult, and we will not have the task of training great numbers rapidly to fit into a mass production process just being set up, although of course, we may have that for a short time in places where new industries replacing war industries demand rapid training for workers. But this will not be our *great* task. Our *great* task, so far as vocational education is concerned, will be the long time task of helping young workers to find out for themselves, through varied experiences, for what types of work they are best suited, and of giving them the training they need for such work. It will be a fundamental task of guidance and training for lifetime satisfaction.

For many years we have been doing for the physically handicapped adult exactly the sort of thing which is now needed for *all*. We have treated the physically handicapped as individuals with life problems to be solved — problems that cannot be solved by wholesale methods, but only by wise and patient study of each case. Now we come to the time when we shall not only have thousands of cases of adults handicapped physically, but also millions of cases of physically sound individuals who need just as much intelligent help in working out their own problems as do the physically handicapped. And we are glad that the Federal Government, our own state staff and our local schools are earnestly working on this problem of *individual* guidance for the adult, and of intelligent training and satisfactory placement.

We do not think of adequate guidance, effective training and satisfactory placement as ending at any time short of the working life of the individual. In this changing world, everyone must face the possibility of change in his work, demanding in some cases almost a complete revolution in methods. It is the purpose of our schools to keep abreast of these changes and to keep the working community abreast of them.

This condition of constant change is well illustrated in my own field, the building trades. Those who go into one of the building trades, must expect to keep on learning their trade as long as they live, and to use the adult school as the agency for that part of the instruction that cannot be provided on the job.

We are probably facing the greatest development the world has ever seen in *home* building. In the countries in which bombing has destroyed hundreds of thousands of old, unsanitary homes and tenements, millions of people are going to have, many of them for the first time in their lives, clean, fresh, modern houses. The British Government has already made its plans for housing developments on a huge scale.

Here in the United States, where there has been no destruction of homes by the action of war, the urge for better housing

*Address given at Milwaukee, Wis., Nov. 3, 1944, before the Wisconsin Association for Vocational and Adult Education.

**President, Wisconsin State Board of Vocational and Adult Education, Madison, Wis.

is coming in connection with the need for rebuilding our cities and outlying communities to meet the demands of the motor age and the air age. We *have* to clear out our slums and build new homes in order to handle our traffic problems, both on the ground and in the air. We have grown accustomed to keeping our old houses until they are ready to fall down, patching them up and bracing them up as long as a patch could be put on. But with the new impetus to housing brought on by community planning for traffic needs, and by the destruction of war, we may develop a steady demand for new houses as we have it for new cars; for scrapping old and obsolete and unsanitary houses, as well as old and uneconomical cars.

I am deeply interested in this problem of housing. I hope to live to see the time when every man who works on the building of a home will be able to have a good one for himself. There is no better proof of the inadequacy of our own economic and industrial system than the fact that so many men who have built comfortable homes for others, cannot afford to live in a good modern home themselves.

I am interested in the whole life of this man who works on the building of homes for others. I want him to have a good home for himself and his family. I want him to have the assurance of year round employment, except for the paid vacation which every worker should have — a vacation which will enable him to go out and see his country and his neighbors in the American continents, and even those across the Atlantic and the Pacific.

I want this man and his family to lead a rich life, not a poor one; to read the best books and magazines, and to have his home filled with them; to listen to the best things that come over the radio; to take part in the community orchestra, the community forum, the community recreation activities. I want him and them to speak good English so that they will not be looked down upon by their neighbors, or held back from promotion because of their illiterate speech; to show good taste in their clothes and in their home. In other words, I want so-called working men and women to have all the advantages of professional and leisure class groups; to make an intelligent contribution to the life of the community, social and civic. I want them to be able to vote intelligently in the interest of the people, to be good officials if they are elected or appointed to public office; to be intelligent and effective members of their labor organization.

How are people who work all day to find the opportunity to catch up with the world and keep up with it?

Here is a task for the part-time school, for the evening school, the adult school. I think that there rests squarely on us, on the schools of vocational and adult education, the task of becoming the cultural and civic center for the people who work all day.

It is comparatively easy to attract to our evening classes those who already have the background of education and culture which make them leaders in the community. We often find evening courses started at the request or instigation of various study clubs in the community. But the study club is itself a class. Many of the members of those study clubs have very little need for our adult classes. The people who really need them most are the clerks in the stores, the workers in the factories, the waiters, the cooks, the meat cutters, the stenographers — all of those who left school early to go to work, and who failed to develop the interests which make rich the lives of people with more schooling.

As our capacity for production increases, our living standards should go up and our leisure time should increase in the form of longer annual vacations, and shorter working days. Shorter working days mean more time for recreation, for civic activities, and for education for those two purposes. We should provide an evening program that will meet these needs and make every effort to attract the people who most need these services.

We should, for example, make an effort to attract our *apprentices* into the community orchestra supported by the part-time school; into the community forum fostered by the school; into the foreign language classes; into the speech classes, the travel classes, the classes in musical appreciation, in literature, history and government. We should make every effort to bring into these same classes the store, office, factory, and food workers.

There is one thing that we have to remember all the time; we are educating employers and employees. In this land of opportunity, we cannot know surely where any of these boys and girls are going to find themselves in the economic world. So we have to educate them for any position they may attain.

So far as employers and employees are concerned, one thing they cannot get too much of, is training in cooperation, in quiet negotiation, in courtesy, in democracy. In the economic world, as in the political world, we can have peace only if we have *government*. And in the economic world, as in the political world, it is important that that government be *democratic*, not *autocratic*. To attain democracy in industry, it is necessary that all classes of employees, management as well as shop and office workers, be trained in peaceful cooperation and negotiations; trained to talk things over, to present their own case clearly; to argue for what they think is right; to give publicity to their own side of the case, but in the end to compromise on the basis of majority rule. As part of our school experiences, vocational education should give all our young workers and all our adult workers, practice in the operation of these requisites for a broader and better life.

Peacetime Vocational Placement Factors

*Earl M. Bowler**

Factors affecting vocational training and placement are in the making now, during wartime. One typical postwar situation which will have to be met is that of an overabundance of womanpower available in the labor market in addition to the normal manpower supply. The number of men engaged in nonagricultural pursuits has remained almost constant since the summer of 1940 while the number of women workers has passed beyond the 18,000,000 mark.

Contrary to popular belief, these women are not an emergency addition to the labor force. Only if their husbands find good jobs quickly when the war ends, will many married women quit work. While some women may leave employment to go back to their homes, many more will want to go on working. The returning veteran, the unemployed war worker, and the 16 to 20 year old will find it a crowded and complex world in which to seek a living when hostilities have ceased.

If one seeks the logical order of first things first, the need becomes one for an orderly discharge of men and women from the armed services. Prior to this time, however, a great wealth of information concerning G.I. Joe's and G.I. Jane's background should be gathered. Personal surveys should be made bringing to light such important items as the educational level of attainment, work experience, occupational training, and the like. The direction in which these young people plan to go vocationally when returned to civilian life should receive mature consideration as well.

Consolidated data from these surveys will reveal the problems ahead to be equally important for all:

1. To see that wages or compensation allowances are sufficiently high so that those who can profit most will be trained best.

2. To see that present day superficial guidance is supplanted by a sound counseling system.

*Dallas, Texas.

3. To see that suitable training facilities are available in adequate numbers to do the retraining job in an organized manner.

4. To see that training is assigned to agencies whose past performance attests to their ability to prepare people vocationally.

Effective vocational training, logically, is followed by placement. Greater effort than has yet been expended will have to be put forth if we are to re-employ the great mass of people who will be available in the postwar labor market. The concept of "utilization at the highest possible skill" has been stressed during the war period. This concept should be carried over into the peace to follow.

During this period the employment service will have to do some of its most important work because the available labor supply will be divided into several groups, each with its own problems. First, there will be those who can go into employment on the same type job as they held formerly. Secondly, there will be those who will be laid off for periods of time probably extending beyond six months. Thirdly, there will be those who plan to wait it out for their old peace-time jobs regardless of the time involved. Finally, there will be a great group of less fortunate marginal workers who will be dismissed outright by plant employers.

What can vocational education do to aid in the readjustment of these groups?

Vocational Education and the Readjustment of Labor

The first group will need little help in getting readjusted. Upgrading of a limited nature could be taking place while these workers are drawing compensation or unemployment benefits. Principal emphasis would be on refresher training or the upgrading for the next job classification ahead.

Those in the second group who will be laid off for longer periods of time should have the benefit of guidance in finding new employment. Unit skilled workers who fall into this group should be given training better fitting them for jobs requiring a few of the all round skills. Workers with semi-technical skills and workers with definite potentialities should be retained in the local community because they constitute an economic asset. This could be done through the medium of employers keeping such workers on the pay roll while the area vocational school maintains or perfects their skills. The improved skill of these workers would more than offset the employers' investment. Loss of these workers to other employers should be small because this retention plan should tend to stabilize employment. Just as an investment is needed to keep a valuable piece of equipment from deteriorating, so an investment is necessary to keep the skills of a valuable worker intact.

The greatest single contribution of vocational training can be made to the third group — those dismissed as a result of the war's end. Planning for this group should be all-inclusive. If economic necessity demands, the best features of CCC and NYA might be rolled into a new made work program for them. The period following the war might well be used to get our house in order for an economic let down and the impact of a made work program predicted by some to hit the nation during the 50's. Guidance and counsel will be very effective in getting this group off to a flying start. The more all-round skills these people possess, the better chance they will have to survive the depression years. The vocational and area vocational schools should be the focal point of activity for these unemployed; moreover, their training period should be considerably longer than for other types of dislocated war workers.

Wartime training facilities may have to be expanded to meet peacetime needs. While we may have adequate machinery to do the job, the personal service angle may have to be expanded. Training should be broadened in the following respects:

1. The area vocational idea should grow.
2. There should be a greater variety of shop courses into which workers might be guided.
3. Courses should be better adapted to adult needs.
4. The concept of paid training should be carried over to meet peacetime needs.
5. Case records of successful war-production trainees might serve as important clues in the selection of bona fide apprentices.
6. A closer working relationship with existing placement facilities will result in improved direction in training and increased activity in placement.
7. Whatever training is given should be "weatherproofed" against the impending "unemployment storm period."

Because the number of job openings is going to be important, the concept of balanced or indexed pensions should be helpful in increasing the number of people willing to retire following the war. Surely, pension dollars should be tied to something. Either prices will have to be stabilized through regulation or pension dollars should fluctuate with commodity price indices. Security with stability will open more jobs for men in the days ahead than any other single move, save the complete elimination of women from the semiskilled labor market — a movement not likely to occur in our time.

Women and children may be encouraged to abandon the labor market through attractive home and school conditions. New housing, new household gadgets, and decent living wages for men will do much toward weaning women from the bench and the lathe. Good living wages paid husbands and fathers will do much toward keeping young people out of the labor market and in school.

What About Those Whose Education Was Interrupted?

The war has interrupted the educational and vocational plans of thousands of young people. Because general educators have been too "cold" to the idea of a student re-entering courses once dropped, vocational educators have a great opportunity in the future for the promotion of continuation education.

A revamping of our guidance system might do much toward salvaging many young people educationally and vocationally. A new term attached to successful guidance might go a long ways toward raising the connotative standard of respectability for the hackneyed words, "guidance and counsel." A better connotation would do much toward bringing young people around for a frank discussion of their future plans.

Plans of the ordinary schoolroom will hold little of interest for those who have been overseas, yet every individual should be given the opportunity to pick up his or her educational training where it was broken off. Somehow, we must provide interesting concentrated courses designed to attract and hold all who can profit by high school graduation or college training. The feeling of being "forever lost" because one has dropped a high school or college course is an indictment against our educational system that needs prompt correction.

Because of its corrective power, general physical training will receive increased emphasis in the days ahead. Experience of the CCC proved the value of outdoor physical activity. Money spent in programs of this nature yield a twofold return: once, in the improved physical condition of our young people (no small item if we are to win a war every 25 years); and, once in improved craftsmanship. The latter, as has been pointed out earlier, will redound to the economic welfare of the nation.

Apprenticeship, that all important function of industry, appears to be somewhat hedged about by rules and regulations making employers reluctant to sign up a vanguard of sincere learners. Every employer should have some apprentices, just as every farmer should have a few colts. After an employer decides how many apprentices it requires to satisfy the replacement needs of his plant he should strive to keep these quotas filled with interested young workers. The semilegal aspects of apprenticeship usually melt away with the signing of the first bona fide agreement.

Rehabilitating the Physically Handicapped

Two additional phases of peacetime planning must be considered: What training is most suitable for the physically handicapped, and what is the woman's place in the postwar economy. One is a specialized training job, the other an economic problem. If the normal forces of supply and demand operate in the peacetime labor market, and we have every reason to believe they will, the latter problem may solve itself. Some women beyond the romantic stage may want to remain in the labor market, but good wages for husbands coupled with excellent housing conditions will remove sufficient numbers to make the problem a minor one. At the

moment, it looks like adequate agency consideration has been given the physically handicapped.

Of great importance will be attempts to stratify job opportunities. Soldiers preference has become an accepted Civil Service concept. There are those who would further stratify the field through a system of point ratings for overseas combat activity. Second preference would be given to those who have served on the home front or in noncombat areas. The hardship this stratification works upon the very young, who through no fault of their own, were too immature to serve in the Armed Forces probably outweighs the good that accrues to the qualified veteran. Such a system seems hardly in order when an ever increasing number of men and women are sincerely desirous of continuous satisfactory employment.

To pay our huge national debt, employment will have to be stabilized and our total wealth increased. One natural resource that can be increased through training is the skill of the working force of the land. The greater the skill of our workers, the greater the value of our assets.

Paid training techniques developed during the war should be more widely used and further perfected so that during peacetime he who can profit most by training will be best trained. Guidance, placement, follow-up techniques should be improved to a point where the labor supply and demand will be better balanced than in the past. These and other factors now in the making will greatly affect peacetime placement.

The Conference Method in Vocational Education

*Murray Banks**

What is the conference method? When is it properly used? How may it be used effectively? What are its limitations? These are questions frequently asked by co-ordinators of distributive education and other business teachers interested in this technique as a method of instruction. This article answers some of these questions.

The Conference Method

The conference plan refers to a systematic analysis and "thinking through" of problems by a group of individuals with a background of experience and with the necessary information required to solve the problems that are presented to the group. Their experience forms the basis for discussion, which is essentially a pooling of thought of a number of individuals, the purpose of which is to assist in solving problems.

The conference is conducted by a conference leader who does not teach new material as such, but aids the members to consider and evaluate problems that are before the group and directs the discussion. The conference leader aids the members to understand their problems, to see them in proper perspective, and to work out a practical solution in terms of the cumulative background of experience which each brings to the discussion. The leader stimulates thought and keeps the meeting running smoothly so that a satisfactory solution will result.

The characteristics of the conference method are generally understood to be as follows:[1]

1. Those in the group have mutual problems which they desire to solve together.
2. They agree to exchange and pool their experience.
3. Each member of the group has had years of practical experience.
4. The subject is within their experience.
5. The group meets to learn together — not to be instructed.
6. The best results are obtained in groups of 12 to 25 persons.
7. For larger groups, a "panel" setup is provided.
8. There can be no set program or course of study, but it is absolutely necessary for a conference leader to plan to a certain extent — always know where he is going, prepare cases, questions, and illustrations on points likely to come up for discussion.
9. Activities are directed toward helping the group members to organize knowledge and experience they have concerning their jobs and to help them acquire good habits of thinking relative to their jobs and responsibilities.

Trainees in cooperative courses are enabled, through the conference method, to consider the problems that they encounter on their jobs and to contribute a variety of ideas toward a workable plan of action, which is finally agreed upon on the basis of the collective judgment of the group.

Such a method can obviously not be used when members are inexperienced and lack a background of occupational information. This method is properly employed when the aim is to secure a collective opinion, modify a point of view, or assist an individual to analyze and organize his experiences, with the objective of discovering more satisfactory ways and means of meeting his responsibilities.

The informality of the conference method appeals particularly to individuals with a practical bent. It is generally successful in creating a high degree of interest and in securing fuller participation. It is useful in fields that are not covered by organized instruction and where it is desirable to develop habits of analysis, integration of thought, or group morale.

When Should the Method Be Used?

Many instructors and co-ordinators frequently ask, "When should the conference be used?"

This question has been partially answered. It may be added, however, that the conference method is an effective technique when a problem needs to be defined or an issue clarified. It is useful when the object is to improve cooperation in an organization or to work out clear understanding or responsibility. This method may be used to interpret policies or standards of conduct — issues which frequently arise in cooperative classes of distributive education. Many co-ordinators employ this method when they wish to show a need for further training.

In such a job-problems conference group, for example, no attempt would be made to teach *how* to sell, but rather to provide an opportunity for each trainee to indicate just how, and with what results, he is already meeting selling situations. These procedures are then carefully evaluated and analyzed by the members of the conference. Conferences are properly held when specific job problems or related problems are dealt with. Such a process presupposes that the members of the group have similar interests and are occupationally homogeneous.

Techniques Involved in Conducting A Conference

The conference method, as it is usually employed, may be broken down into several clearly defined steps.

1. The group must first understand exactly what problem is under discussion.
2. The problem must be clearly delimited and understood by all.

*Associate Professor of Marketing, Long Island University, Brooklyn, N. Y.

[1]Report on First National Training Conference for Distributive Education, issued by U. S. Office of Education, 1939, p. 9.

3. The members of the group should feel motivated to contribute their best efforts and to otherwise cooperate in bringing about an effective solution of the problem.

4. The conference leader assists in analyzing the problem by breaking it down into its component parts and in pointing out the real points of difficulty.

5. After the problem is clearly understood, it is necessary to assemble and select all the data that bears upon it. These data are drawn from the background of experience which the members have or from the experience which they have gained from previous reading or discussion.

6. The data thus gathered, selected, and interpreted are presented in written form on the blackboard or charts.

When these steps have been logically followed through, it is then possible to evaluate the contributions which have been accepted by the members and to sort out and retain the most pertinent data. When all sides of the question or issue have been considered and the various factors evaluated, it is necessary to make a decision based upon the true facts.

To be of value, this conclusion should be a solution that is approved by all, or by a majority of the members. It should be logical, reasonable, and within the power of the group to take the actions suggested. If such specific action is not within the power of the group, obviously such a discussion is fruitless, and does not end in a practical solution that can be made to function.

When a decision representing the best knowledge of the members has been reached, it becomes necessary to formulate a specific plan to carry out the decision. Such a plan would make clear by whom the plan is to be executed, the best method in which to carry it out, and when it may be put into action. This emphasizes the need for a workable and reasonable plan.

Finally, the plan should be carried out along the lines that have been determined by the members of the conference and the results checked by the co-ordinator, who requests the members to report back as to the outcomes and the results obtained.

The Role of the Conference Leader

To conduct a conference skillfully is not easy. There is an art and a real skill involved in the ability to guide and to direct group discussion. The conference leader must be able to secure the confidence and hold the respect of the members. He shows real skill when he assists the group to organize pertinent points which bear upon the problems under discussion. As stated earlier, he is not required to, and does not, personally express opinions, but serves to draw out the best information and thinking of the conference members. It is important for the conference leader to be able to reduce to writing, in brief, explicit form, the major points that are discussed.

The conference leader must be able to ask questions in a skillful manner so that even the shyest member present makes some contribution. He must be able, through questioning, to determine whether there is real understanding of the problem and to get the members to think along the lines which he wishes them to follow. The conference leader must have the ability to present cases which stimulate discussion and to capitalize on the experience of the members.

He must be able to develop a body of workable facts upon which worth-while decisions can be formulated. He must know how to employ all types of visual aids to best advantage. The conference leader does not himself answer questions but skillfully turns back to the group questions that are put to him. He immediately assumes the role of the teacher, rather than that of discussion leader, if he answers the question himself. It is a basic rule that the leader does not express his own thought, but stimulates the thinking of all the members in the group.

It is clear that the conference method is workable only when the group members can contribute experiences which are already their own. An adept conference leader succeeds in organizing these experiences so that the members are able to analyze, evaluate, and more intelligently think through their problems, eventually arriving at a conclusion which can be directly applied in solving the immediate problems which face them. It is not a method which can be used indiscriminately with all types of groups, but as already stated, may be used successfully under certain circumstances and for certain purposes. Ability to lead conferences intelligently and fruitfully comes only with a thorough knowledge and understanding of conference-leading techniques and ample opportunity to use these tools.

When properly used, the conference is a splendid method for mobilizing the best thinking and crystallizing the ideas of a group and stimulating the members to arrive at a solution.

Limitations of the Conference Method

As considered for use in distributive and other vocational education courses, the conference method has some definite limitations as to its use. It is not an informational procedure, nor is it an instructional procedure. When it is necessary to introduce new information or to clarify points, the conference leader must necessarily resort to some method other than the conference method. It should be understood by all who make use of this technique that it must be reserved for use in appropriate situations and for purposes for which this method is suited. When it is so used, many essential values are achieved.

Summary of Advantages

In summary, it may be said that the conference method has the following definite advantages:

1. Informality appeals to practical persons.
2. The conference creates a high degree of interest.
3. Permits full and equal participation by learners.
4. Brings satisfaction through mutual achievement.
5. Useful in fields not covered by organized instruction.
6. Develops group morale.
7. Develops habits of analysis and integration of thought.

It is effectively used:[2]

1. When an emergency arises and there is not enough time to wait for a scientific solution. It is a *trouble-shooting device.*
2. When a problem needs to be defined or an issue clarified.
3. When you seek to improve cooperation in an organization.
4. When you need to work out clear understandings of responsibility.
5. When you need to interpret policies and standards of conduct.
6. When you wish to show a need for further training.
7. When individuals in a group possess knowledge pertaining to the problem, and wish to pool the experiences and knowledge of the group for discussion and evaluation.

[2] *Ibid.*, p. 9.

There are two basic needs which must be met by vocational education, namely, (1) the need for individual competency, and (2) the need for society to have its work properly done by an adequate supply of trained workers at all vocational levels.

To meet these needs:

1. Vocational education must be universally available, to all classes, all ages, and conditions of our citizens.
2. A really functioning program of effective vocational guidance must be available to all.
3. Programs must be flexible to meet the many varying needs of different individuals and of different kinds of vocations. The rigid educational schemes of the traditional school system cannot possibly meet the needs.
4. Many special schools will have to be organized to provide for special regional and local conditions. Among those which will be needed are: area vocational schools serving areas much larger than traditional school districts; trade schools in large industrial centers; technical institutes for older students who desire to work at jobs requiring special technical training of less than professional grade; many cooperative, part-time schools will be needed; and publicly supported and managed correspondence schools should be provided. In all these, short-unit courses, part-time courses, full-time courses, and evening courses will be a necessity.

It will cost much money, but experience teaches that to provide adequate vocational education facilities to all the people is cheaper in the long run than to fail to do so. Human failures due to inadequate training are a drain upon both the social and economic life of the nation. — *Arthur B. Mays.*

Industrial Arts and Vocational Education

John J. Metz, Editor

How Does Our Product Measure Up?

The education and vocations committee of a midwestern business and professional women's club recently made a survey to ascertain how the 14–20 year age group of boys and girls recently graduated from high school were fitting into their places in the working world.

Questionnaires sent to employers show that the beginner in commercial and industrial establishments is expected to have: a sense of responsibility toward his job, his fellow workers, the financial obligations into which he may enter, and toward the customers whom he may have to serve. The employers also expect these beginners to have the ability to meet people courteously, to dress becomingly, to have the proper attitude toward life, and to possess a sense of humor.

The survey also shows that the employers, in general, are interested in the school records, health, family, and leisure-time interests of the young applicants.

Strangely, and this is in variance with conclusions so often obtained from questionnaires of this kind, the employers on the whole expressed the idea that the high schools were doing a fair job with their students. They stated that most of the young people whom they had hired, seemed to know how to apply for a job, and how to meet people, and they felt that the youthful enthusiasm usually made up for the lazy streak some of the new employees possessed.

While the findings of this committee were rather favorable to the school, nevertheless, it still contains direction pointers which ought not to be overlooked. There is still much room for improving the matter of finishing our product so that it will better fit into the workaday world when we issue a diploma which says that we have completed our work of educating a certain boy or girl up to a given level.

Postwar Drafting

Industry has learned some interesting things from the experiences which it had during the trying days when it had to change over from the unhurried, below normal production of civilian goods near the end of the depression period, to the ever increasing tempo of furnishing war necessities to the warring nations, and later for our own use in the European and Pacific theaters of war.

One of the serious obstacles was to train workers not only to operate machines with which they were totally unacquainted but also to have them take the information needed to do the job from blueprints which made use of a method of presentation with which they were unfamiliar.

Of course, school and industry worked together and did a wonderful job in training these new workers so that production progress could be made. It was in connection with the assembly of complicated parts that it was discovered that isometric drawings of the parts that made up the separate parts as well as the completed unit gave great assistance to those who were not thoroughly familiar with blueprint reading as it was taught in the past.

This discovery is well worth exploiting to the fullest, but the drafting teacher must not forget that orthographic projection must continue to be a very vital part of the draftsman's training. The learner who intends to enter an industrial drafting room must still be able to make orthographic projections of the necessary views of an object, giving all the dimensions and information which the patternmaker, machinist, toolmaker, and other workmen must know before they can perform their work.

In the training of future mechanical draftsmen pictorial drawing must be emphasized considerably more than has been done in the past, but the main stress must still be placed on the orthographic projection with which teachers of drafting are so familiar.

Another point that must be given more emphasis than ever, is the clear conception of what is meant by "third-angle" projection. This is an important piece of information for the student of drafting, especially when we consider that European drawings may find their way into our shops in greater numbers during the postwar era. Students ought to know that most foreign draftsmen use the "first-angle" projection, and that such a drawing when placed into the hands of an American workman may cause exceedingly costly mistakes.

The three points just mentioned, therefore, should find a place in the postwar planning of drafting programs.

Pride of Accomplishment

There are many Americans who seem to have an inferiority complex when it comes to comparing the things made in this country with those produced elsewhere. There are some who are willing to concede without argument, that foreign mechanics and products are much better than our own; that the best engineers are all foreigners, and that if extremely fine instruments are needed, they must be obtained from Europe.

It may be conceded at once that foreign engineers, inventors, mechanics, and the things they make may be, and usually are, very good. We may also concede that many of their best men in the past, emigrated to America to earn a better living than they could have earned at home. We benefited by their knowledge and skill. We may also concede that the fine instruments bought in Europe are usually accurate, well made, and comparatively cheap. We must not forget, however, that the very cheapness of the instrument makes it unprofitable to have them made here. Our mechanics could make instruments that are just as good as the imported ones, but they could not make them as cheaply. Our mechanics earn a living, not just a subsistence wage, and they, on the whole, live in decent houses — not in hovels.

When it comes to accuracy the American mechanic needs yield to no one. Automatic machinery, short cuts in manufacturing and assembling, and the use of power to conserve human energy, are to a large extent, America's contribution to the industrial world.

The miracles of production during these past few years have shown the world what American ingenuity and skill can do. It is time that we begin to realize that the myth of European supremacy in the engineering and industrial fields is not based on sound facts.

In the field of metallurgy, too, the United States can justly claim that it can produce practically every kind of steel or alloy that can be made anywhere in the world. Many of our steels are better than those produced elsewhere, and when it comes to tonnage we stand unequaled.

The students who attend our school shops should be told these things. Theirs is a noble heritage, and it is our duty to acqaint them with this fact.

The Consumer Looks at Industrial Arts

*Walter I. Shockey**

In these trying days of priorities and rationings the problem of consumer education in industrial arts is one that demands close attention. And apparently few industrial-arts teachers are even aware of the problem much less trying to do something about it.

A few years ago and now again today the pendulum is swinging toward practical trade courses. Skilled workmen, specialists in one field, trained in one specific operation are being produced in great numbers in mass production. Defense industries do need these men and there is a place for this type of training. The skills are all to the good but the stress is upon increasing one's money-making ability and not at all in developing consumer skills that would tend to increase the purchase value of the worker's dollar.

In normal times this nation spends about 17 billion dollars annually for food, about 8 billion for clothing, 4 billion for home furnishings and about 6½ billion for automobiles. Does industrial arts function properly if attention is not paid to problems like these?

Even before the present crisis, industrial arts and related subjects have not always kept pace with the social-economic changes of the times. Consumer education has long been recognized as an objective of industrial-arts education and much fancy "lip service" has passed among educators as to its importance. And like most other objectives, consumer education has long remained a phrase on paper — something to be talked glibly about but not be acted upon.

The Ohio Prospectus for industrial-arts education gives consumer education as a major objective of the program and in almost the same breath the statement is made that this objective is very badly undeveloped and unworked.

A bulletin prepared by a committee appointed by the commissioner of education to study industrial arts and its interpretation in the American schools lists consumer literacy or consumer education as a major objective. It has been stated repeatedly that there exists a great need for more work and emphasis on this neglected aim.

A careful analysis of the *Reader's Guide to Periodical Literature and the Industrial Arts Index* from 1932 to the present time indicates only two specific references to industrial-arts consumer education. Although a wealth of material has appeared during the past few years most of it deals with the business training aspect or the home economic viewpoint. These two fields, along with the social studies have taken the initiative in developing consumer education in the schools.

A casual examination of abstracts and lists of thesis problems reveals several studies dealing with consumer education but most of them were statistical surveys or analyzations of current practices, trends, etc. Not one thesis problem in industrial-arts has attempted to establish the present status of consumer education in industrial arts, determine the need or develop a teaching procedure. As near as can be ascertained there has been only one thesis written so far on this important aspect of industrial arts and it was limited to "a study of the term 'consumer knowledges' and its use as an industrial-arts objective" and was written years ago!

Some industrial-arts teachers maintain that they do teach consumer education "incidentally, along with other class work." This statement may be valid in a few exceptional cases, but on the whole does not contain weight simply because teacher training institutions have not been preparing industrial-arts teachers to teach consumer education as such.

In a survey by the present writer only 16 out of 75 industrial-arts teachers indicated that their college preparation for teaching industrial arts included consumer education. Sixty six of the 75 felt the need for further preparation and practically all replied that they would use some kind of consumer education program for industrial arts if it were made available.

These facts indicate that some few are beginning to realize the necessity for functional industrial arts to meet the total needs of the individual. However, much remains to be done and it is a sad commentary upon leaders in the field that they have been too long concerned in teaching young people to earn. The *spending* of money is just as important, and it is high time to forget the old popular belief that consumers will somehow learn the art of living without any special training.

What to do? The answer is obvious: Take the consumer objective off paper and put it into operation in the shop. The average American family today in one year avails itself directly or indirectly of more than 90,000 separate items and services. A great department store like Macy's offers over 35,000 choices to the bewildered buyer. Industrial arts offers a wonderful opportunity to create an intelligent questioning attitude in the mind of the student in regard to the selection, care, use, and operation of some of these industrial products and services.

Which is the better buy, solid or veneered furniture? Why are 2 x 4s not 2 x 4s? What causes the difference in price in the various brands of paint? What should I look for in buying a refrigerator? How can I prolong the life of my auto tires? How can I increase the gasoline mileage on my car? Is it wise to build a home in these unsettled times? Where can I get information on efficient and economical operation of my electric stove?

These and many more are vital problems that concern the industrial-arts student. As a prospective citizen in a democracy he is entitled to a clarification of them. Of course, he wants to know how to turn out a gadget on a lathe, but he also wants to know how to live, how to live within the limits of his income, and how to use his skill and mind in socially profitable ways.

Industrial-arts consumer education is a virgin field offering all the answers to these critical problems of everyday living. The challenge is there, the important question is: When are we going to accept it?

*Industrial Arts Dept., Miami University, Oxford, Ohio.

THE SHOPBOY

Leonard E. Schmidt*

In English or in science class
He isn't worth a snap,
Although he tries, it's just "no go"
Seems he has no thinking cap.
But when he comes into the shop
He's like a different boy,
The work is fun, he gets much done,
Just watching him's a joy.

I guess there are lots of boys like him
Who find their bookwork "tough"
But in the shop, they never stop,
Can't seem to get enough,
And so he's found himself a place,
He's happy at his task,
If this should help him earn his way;
That's the reward I ask.

*Lincoln Hall Vocational Shops, Lincolndale, N. Y.

If we are to continue to substantiate our claims for the industrial subjects as necessary parts of a general education and as having both guidance and training values, we must be certain of these things: The courses offered must broadly explain industry; the content of the courses must be a fair sampling of the skills and knowledges of the crafts selected; the teaching methods must be as varied as the difficulties of students and of subject phases; the manipulative work assigned must picture the life of the mechanical workman.— *Homer J. Smith.*

A Cooperative Apprentice Program

*F. N. Newton, Jr.**

The cooperative apprenticeship program between the Westinghouse Electric and Manufacturing Co., and the Sharon Senior High School was begun in the spring of 1943.

Fifty two boys were selected after examinations were given to determine their eligibility. Their ages ranged between 16 and 18 years. These examinations were given to boys who requested an opportunity to enter the program and consisted of I.Q. tests, mechanical aptitude tests, and a test covering the mathematics the students had covered in school.

The boys who were accepted were indentured for a three-year period as apprentice machinists and draftsmen. Forty-four of the boys entered as machinist apprentices and eight as drafting apprentices. The boys were selected from the then present sophomore class but who the next fall would be juniors. This would give them two more years in school and as they spent two weeks in schools and two weeks at the plant they would be given only half credit on their trade for the first two years. In other words, the indenture would take four calendar years rather than three years in order for them to put in the required number of hours. All the boys start out by working several weeks in the tool cribs in order to familiarize themselves with the tools used in the shops. From the tool cribs they go into the shops and are rotated to the different machines.

In the spring of 1944 we tested another group of sophomores, giving them various Kopas board tests, a mechanical co-ordination test, and a general mathematics test, covering the mathematics the student studied up until the end of his sophomore year. From these tests we secured another fifty prospective machinists and draftsmen. As stated previously, these boys spend two weeks at the plant and then two weeks in school. While in school they follow a special program which consists of the subjects the State requires us to give along with their related work. They come under a special group of teachers and they take up their lessons when they come back to school just where they left off when they went to the plant.

While in the plant they also go to school and study subjects necessary to their trade. They get two hours each week in these classes and for 12 weeks study blueprint reading, for 4 weeks precision instrument reading, and for 6 weeks a short course in shop mathematics. Each group also attends a one-hour safety meeting each month. At these safety meetings talks are given by safety supervisors, shop foremen, and other key men in the plant. The boys are encouraged to report any unsafe conditions or acts they may see on the job. Each month safety leaders are appointed from the group and it is their duty to get reports from the other boys in the group regarding any improvements along safety lines they may think necessary. Many thousands of dollars are spent annually on safety by the Westinghouse Company and no stone is left unturned to eliminate any unsafe conditions that might cause injury to their workmen.

The experience these boys get at these safety meetings is excellent for the students, for they learn to speak before a group and soon cease to be self conscious.

The apprentices start in at an hourly rate of 55½ cents for each hour spent at the plant. While in school the two years they get a raise every 6 months on a calendar month basis. After they graduate from high school their raises come each 1040 hours worked until they finish their indenture.

The course of study followed in high school is as follows:

Junior Year	*Senior Year*
English	English
Industrial mathematics	Industrial mathematics
Industrial history	Problems of democracy
Mechanical drawing	Physics
	Trade drafting

Most of the boys who get into this program have had mechanical drawing during their freshman and sophomore years and have also had shop work in our school shops so they have a good general idea of what they are getting into. The program has been functioning very well and the boys generally like it. There is no question that it furnishes the boys a wonderful opportunity to earn money which makes them practically self-supporting and tends to keep them in school until they graduate, and lastly, gives them an opportunity to learn a good trade or vocation.

The boys in the drafting course are indentured for only two years and receive the same pay as the machinist apprentices and graduate into the pay of a junior draftsman. All drafting apprentices spend one year in the shops where they get very similar experience to the apprentice machinists, although not as extensive. These boys follow the following schedule in the plant:

Engineering drafting room
Blueprint department
Document vault
Blueprint department
Document vault
Manufacturing information division
Tool crib
Bench work
Radial drill press
Layout work
Shaper and milling machine.

All shop apprentices are graded monthly by the foreman and group leaders under whom they work, and during a three-year period it is possible for a boy to be graded by twenty or more group leaders or foremen on the following characteristics: attendance on the job, appearance, reliability, attentiveness when given instructions, and performance. His final grade is determined by one-third schoolwork in high school and two-thirds work in the shop.

*Co-ordinator and Supervisor of Industrial Education, Sharon, Pa.

The Draftsman At War*

*E. H. Cameron***

In the May 8, 1944, issue of *Life* there is an article describing how Chance Vought Aircraft, in Stratford, Conn., used the exploded-view method to show how to assemble the 250,000 parts which go into a Corsair fighter plane. The new help at that plant couldn't read blueprints, so their draftsmen did what we in our office have been doing for several months; made isometric or perspective views of the parts in the order in which they should go together in the assembled mechanism.

Thousands of engineering drawings precede the making of a bomber fighter, LST, LCT, PT boat; the many types of artillery; and the tanks, jeeps, ducks, and trucks of mechanized warfare. There are also drawings for all types of munitions; the machinery which makes such munitions, and for the big structures in which they are manufactured; airports; embarkation docks; and all the rest of the units of war industry. It is said that it takes 20 tons of blueprints to make a battleship.

Engineering Drafting

The engineering drawing is the instrument — the tool — whereby the concept of

*From an address given May 20, 1944, before the Mechanical Drawing Association of New England.
**With Jackson and Moreland, Boston, Mass.

the inventor or designer is imparted to the mind of the mechanic who will turn the idea into an integrated operating unit of steel, aluminum, or copper, ready for use.

The drafting teachers at school train the men who make these engineering drawings. Do these students when they enter industry do their work efficiently? How is the efficiency of a drawing measured? The efficiency of a drawing, it may be said, is the degree of success with which it photographs on the mechanic's mind, the concept of the man who had the original idea. How quickly and how accurately has the drawing done this?

For instance: Let's say that 1000 man-hours of study of a folder of drawings covering a certain machine unit have been required by foremen and machinists before actual fabrication of patterns, templets, jigs, and the rest could start. Let us assume, too, that the drawings of this folder were made by a draftsman of average capability — draftsman A.

Now, let's imagine that at the next drafting table there is another draftsman who makes his drawings for an identical unit, but that the mechanics and foremen found it necessary to expend 1111 man hours before starting production. Obviously, drawing folder No. 2 would have an efficiency of 90 per cent compared with drawing folder No. 1; because 1000/1111 = 90 per cent.

Certainly, we must admit that there is such a thing as a draftsman's efficiency; and if teachers of drawing could but increase the efficiency of the average student by a small amount, it would represent a great saving when one considers the millions of drawings that have been made in the past few years.

Specialization

It is true, the teacher's contact with the student draftman's mind is very brief, compared with the years of later training which he acquires in industry. Only in actual practice in engineering and architectural offices can the student gather the vast amount of detail information which he has to know before he can class himself as good. There are numerous fields, each with its own peculiar standards, such, for instance, as the standard way of showing the railroad turnout, the airport layout, the structural steel framework, the concrete structure, the assembly and detail drawings for machine mechanisms, the electrical wiring diagram and switchboard layouts, the many power plant piping systems, the gas or water distribution system, and the huge list of the tremendously diversified areas in which the draftsman may work.

The beginner starts to become a specialist in one of these fields the day he enters the door of an industrial establishment after he leaves school. No one teacher can expect to know all the drafting standards demanded by these various fields.

During the past year, the writer's firm had to prepare illustrated instruction books for our new workers. From thousands of good machine detail and assembly drawings, we had to select illustrations which were to be used by men, many of whom are not technicians. Three types of men are essential to an organization, if it is to do a good job at such a task: (*a*) men with superior and broad engineering experience; (*b*) men with the educational slant on things; (*c*) men who can draw.

The average machine drawing, even for a simple mechanism, is an involved piece of work. To many people an orthographic projection is difficult.

Then think of the Corsair's 250,000 individual parts, each one of which has its detail drawing, and which may appear on the various subassembly and assembly drawings of the whole mechanism as put together. These drawings have to be made by the orthographic method, because, among other advantages, it is well adapted to the insertion of dimensions. But just as the builders of the Corsair found out, there is a place in the program for several isometric views to act as catalysts for the reaction involving the orthographic views. Too long have we neglected the opportunity to speed up the time required to read orthographic drawings by adding that fine catalyst — the isometric view.

Isometric Drawing

This is exemplified by the project, previously mentioned, the illustrated books on complex technical subjects, which must be made comprehensible to many who are not technicians. We soon learned that we were not improving the clarity of the subject by making fine tracings of various orthographic views which appeared on the source plans from which we worked. They still didn't put across what we intended. Of course, we used the camera and the air brush; but we found the camera was too honest in many cases. It insisted on showing the detail of parts which were to be used later on. Hence, the isometric and perspective came automatically into our program. It is a pity that I may not show you certain views which were produced by our draftsmen and artists, and which sometimes leave one in doubt whether they represent camera views that were touched up, or whether they are isometric drawings that were shaded and highlighted with the air brush by the artists.

An official in Washington remarked about a year ago that it was hard to get draftsmen who were able to make good isometric drawings. The writer felt that any good draftsman who knows his projection can make an isometric of the thing; and when necessary, make entire layouts, showing the several levels and with the right and left-side features, because, all he had to do was but to add the several views together. But he found out soon enough that even capable draftsmen could not always make good, complicated, isometric views.

There is an important place for the isometric method in the modern system, because they eliminate one mental step — the mental addition of the third dimension. In proof of this, good machine draftsmen frequently make freehand isometric sketches before they start their orthographic views. Usually, there are but two or three men in the force who can do this. They have visualizing talent; that is why they are good draftsmen. It is well, therefore, to teach more of the isometric and allied methods in the high schools. Ability to visualize must be cultivated early, and experiences of the past year has shown that the ability to visualize things in space is quite possible to the younger minds.

Drafting Knowledge

To be specific, then, the school drafting teacher should prepare his students to know the principles of orthographic projection inside out. They also should know descriptive geometry and be able to visualize. The best vehicle for this is the course in descriptive geometry, followed by drafting applications via the isometric view and the perspective.

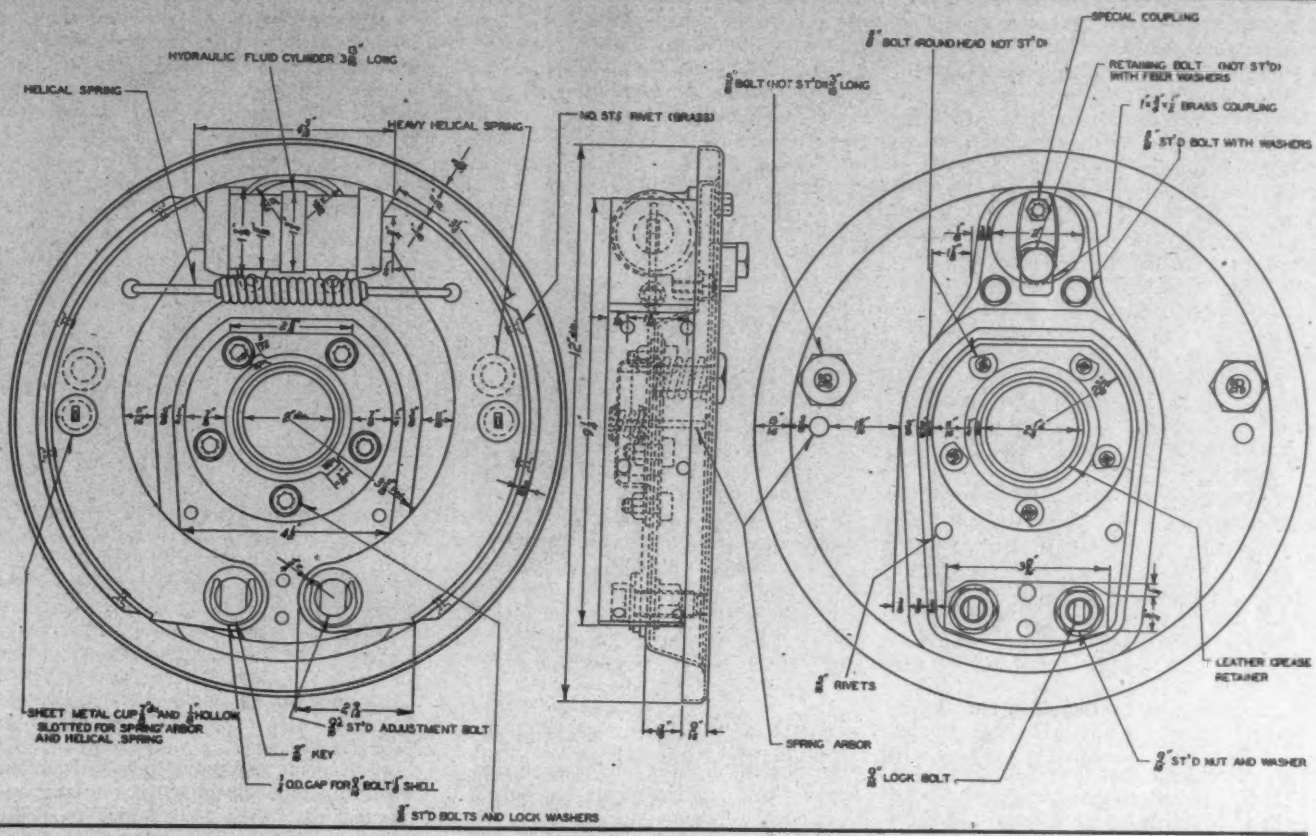
Vision is a priceless gift of youth; nursed in the delightful childhood atmosphere of Grimm and Anderson, its culture is neglected by most of us as our minds are exposed to hard realities. A fortunate few retain this quality. We call such men "original thinkers" — men who have learned to extend the fine quality of imagination to their adult problems. We usually think of vision as applying to wholly mental concepts; but in the engineering world, vision constantly takes on a physical meaning which extends to the ability of visualizing the engineering units of production in space.

Exploded Views

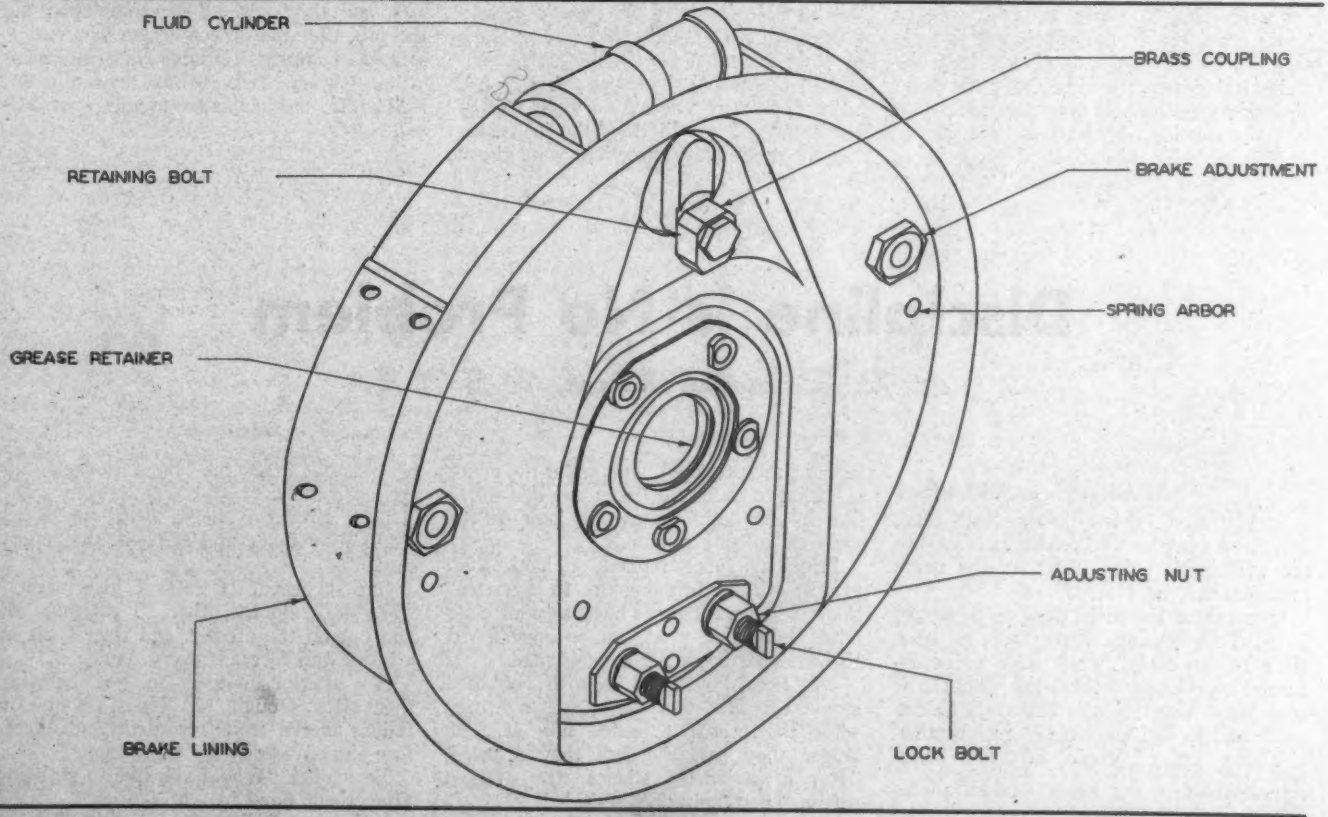
The preparation of illustrations of complex apparatus which will be understandable to nontechnical readers, is a specific application. It has served, it is hoped, as a vehicle to put across a wider application of the isometric and allied drawings. In three aspects it can be very useful in the whole broad field of engineering. First, the visualizing power, developed early, should prove invaluable to engineers in whatever capacity they may serve later; secondly, it can be of great use in putting across the ideas of the inventor or designer to the later draftsman whose task it will be to draw the orthographic views with dimensions. As to its third value, I shall just refer you again to *Life* Magazine which describes its use to instruct unskilled help in the mysteries and intricacies of shop assembly.

Mr. A. L. Coyne, past president of the Mechanical Drawing Association of New England, will explain, in that which follows, how he has applied some of the ideas expressed in this article in his drafting room.

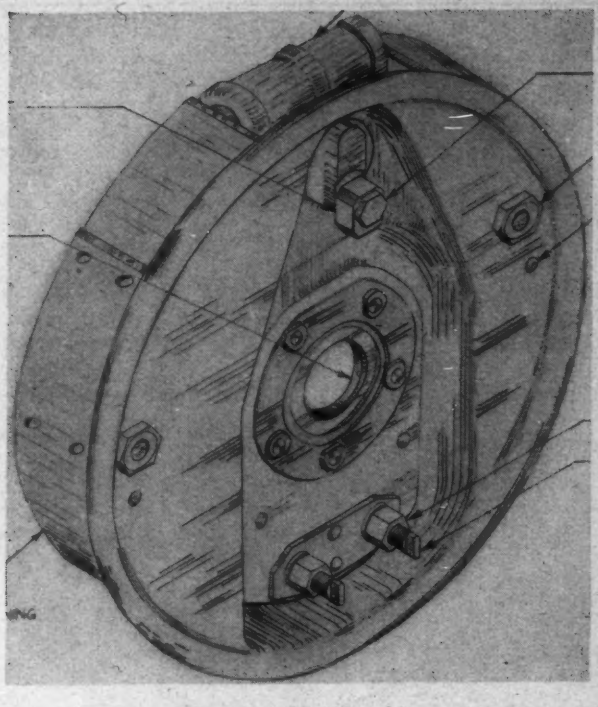
The object shown in these drawings (a brake housing from a Chrysler car) was selected at random from the auto shop of the school. The only feature required of the item to be drawn, was that it be an assembly of two or more parts. It was



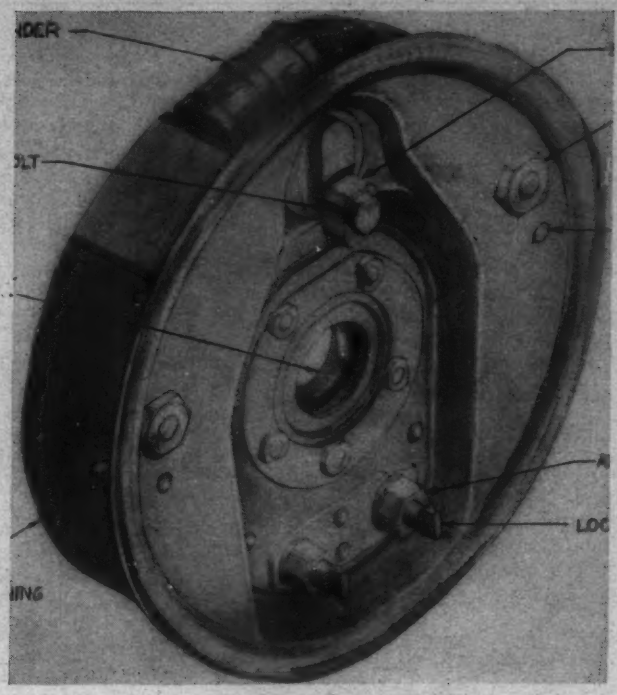
Drawing No. 1



Drawing No. 2



Drawing No. 3



Drawing No. 4

mere coincidence that the object demanded a shading technique that some would judge to be too difficult for schoolboys. This difficulty, however, did not arise.

The two students who made the drawings were both 17 years of age. Student *A* was considerably below the average of his class in scholastic standing. He took mechanical drawing during the three previous years (40 minutes per day). He was employed outside of school on a 3:00 to 11:00 p.m. shift during all of the school year. Student *B*, also employed outside of school (in a drafting room) has only had mechanical drawing during the current year. Student *A* made drawing No. 2, and student *B* made drawings No. 1 and 3. Drawings No. 3 and 4 are pencil tracings of drawing No. 2 with the shading subsequently added. A boy in the art department of the school shaded drawing No. 4.

The boys were allowed to work free of interference of any kind by the instructor after the preliminary directions were given. Both students expressed their satisfaction with this type of drawing and later requested that they be allowed to make isometric views from orthographic drawings. The boys enjoyed making the drawings, and they felt, at the completion of the job, that the object drawn was really completed, ready for immediate interpretation, rather than to be co-ordinated legibly to mechanically minded persons only.

Discipline is No Problem

*Lt. R. Randolph Karch, U.S.N.R.**

Punishment — or Education?

Red of face, jowls quivering with rage, Mr. Brown herded two reluctant boys into the principal's office. Without the usual preliminaries, he blurted:

"Something has to be done to these two boys! They utterly refuse to bring back their report cards! They were to be returned a week ago. I think they ought to be sent home after them!" The boys brightened, and looked knowingly at each other.

Three angry people off the beam, thought the principal, who noted the acute agitation of each. Now how can this situation in the daily routine be handled for the good of all concerned?

Principal Jones replied, "Thank you, Mr. Brown, for bringing this to my attention. If you want to go back to your class now, I shall see what can be done." Mr. Brown departed, in a righteous rage.

"Sit here, boys; I'll be with you in a moment." The two boys sat, scowling, while the principal busied himself. The longer they sat, the less they scowled. After a period of silence, they talked softly. Their agitation subsided.

Mr. Jones checked the cumulative record of each. Fair — not good, but not failing. Little disciplinary trouble recorded. Just boys. Cordially, he swung about in his chair, and the boys looked up apprehensively.

"Mr. Brown is being held up in his work. Why don't you bring in the report cards?"

One shrugged. "I guess I just forget." "Yes sir," said the other, "I got mine all laid out on the dresser, and then I get in a hurry and forget it every day."

No ulterior motives in not bringing them back, thought Mr. Jones, because no failing marks were recorded, and therefore signed readily by the parents.

He smiled. "Would you like to go home after them now?"

"Oh yes, sir," they unisoned, leaning forward.

"Let's see now," Mr. Jones smiled, leaning back in his chair. "That would prob-

*Principal-on-leave, High School of Graphic Arts and Printing, Cincinnati, Ohio.

ably take you about an hour and a half, and you would miss the next two classes, not counting this one. Is it good to get behind in your classes, and then have extra work to make up?" He raised his eyebrows quizzically.

"Well . . . no," said one, sinking back in his chair.

The principal took two small cards from his pocket, wrote briefly on each, and folded them into small squares. The boys looked on in interest.

"I notice that both of you, like most boys, have the habit of placing your hands in your pockets." The boys nodded. "I want you to put this card in the pocket you use most. I have written 'report' on each card. This is the plan: Tomorrow morning, before you leave home, you will, by habit, put your hand in your pocket. Is that true?" The boys nodded. "When you do," the principal continued, "you will feel the card, and you will remember what is written on it — or, you will wonder what it is, and take it out and read it. Right?" The boys acquiesced. "Then, and *immediately*, you will get your report card, and put it in your pocket." The boys raised their eyebrows, pursed their lips, and nodded to each other.

"When you get to school," continued the principal, "just look in the door if I am busy, and when you catch my eye, wave the report card, and I will know then that everything is all right."

"Sure we will," said one, pleased with the plan.

"Come in and see me sometime when you are not in trouble, boys. That's all." All were laughing as the boys left the office.

The reports arrived, according to plan.

Education — or *chastisement?* Educators can make it what they will. Children can be taught to remember — they can be taught to remember more easily than they can be punished to remember. Their morale can be beaten down by punishment, which is one misnomer for "discipline."

The principal solved a *disciplinary problem* by the simple expediency of *education*. The boys did not know how to remember, so they were taught how to remember.

How to Keep from Having Disciplinary Problems

Little has been written on how to specifically handle disciplinary problems. The technique is usually learned by trial-and-error, or is already known through a most uncommon inborn *common sense*. No courses exist on how to deal with disciplinary problems in most teacher-training institutions, some of which rather prefer to teach *about* education rather than to show a novice *how* to teach. The writer puts down here a few workable techniques which will help any teacher in disciplinary problems.

Discipline Is the Teachers' Job: It is not the duty of the principal to keep order in a teacher's class, or to see that report cards are returned. His job is to step in when the teacher is in trouble over his head — he is a court-of-last-resort. If your principal can tell others that you "get along well with children," it is a feather in your cap. Don't be like Miss Blank, whose principal used to sigh when she sent still another student to his office, and say to him: "That row of chairs is reserved for Miss Blank's students. Please join the crowd." The result was that poor Miss Blank was shunted from school to school, and from one duty to another, in an attempt to find a place where she could "get along" with students.

How to Make Friends With and Influence Students: Teachers who are well liked — and respected at the same time — have little or no problems with disciplinary problems. A few simple rules, discussed in succeeding paragraphs, are outlined here: (1) Be humane. (2) Be consistent. (3) Be fair. (4) Respect child activities. (5) Refrain from humiliating. (6) Refrain from making threats. (7) Be positive; not negative. (8) Teach in your class, don't punish in it. (9) Refrain from en masse correction. (10) Use good teaching techniques. (11) Assign no busy work. (12) Refrain from argument. (13) Be a friend — but not a pal. (14) Help other teachers. (15) Refrain from using expulsion for correction. (16) Use no informers. (17) Keep your temper.

1. *Be Humane:* The writer, as a hypersensitive youth, was often the butt of teachers' sadist wit. Although such methods made other students laugh, and gave them good feeling in a morbid sense of the word, such class motivation was very painful to the writer, and made his school adjustment difficult. If a teacher must be a wit, he should not make a student the butt of funny remarks. If wit requires a stooge or a straight man, the wit should be eliminated.

When a teacher is not feeling well, or is under mental strain or worry, he should refrain from taking any drastic action against students. The state of one's liver should not influence his disciplinary measures.

To strike a student in anger often means that the teacher strikes himself out of a job, or perhaps goes through the difficulties and worries of a lawsuit for assault. When one feels in a slugging mood, it is time to call in higher authority for smoothing the troubled waters.

2. *Be Consistent:* Consistency should be followed in disciplinary actions. Play no favorites. A good teacher does not allow likable students to "get away with murder," while he verbally slaps down another less likable one for kindred mischief. If your students pick out certain individuals as "teacher's pets" teacher is practicing the wrong disciplinary techniques, which will militate against him as well as against the pets involved.

3. *Be Fair:* When talking to other teachers you find reactions to students who will be your students one day. Do not be unduly influenced by their remarks. When they say, "John Fox is a very bad boy; watch for him when he passes to your room next week" — *don't do it!* The boy may be awaiting the chance to show his next teacher that he is as good a student as any other. He may, in fact, be as glad to escape from his present teacher's room as he is to let him go. Give him a fair chance — don't antagonize him by letting him know that you are familiar with his past, that you will watch him — and he will behave — or else!

4. *Respect Child Activities:* A child's interests and work are just as important to him as your interests and work are important to you. Show respect for the activties of youth. Don't sneer at the unimportance of their interests. Never intimate that their activities are inconsequential.

5. *Refrain From Humiliating:* Avoid using abusive language. Do not humiliate and anger students by telling them outright or even insinuating that they are "dumb." If a student is stupid, he can't help it, and nothing is gained by reminding him of the fact. If he is lazy, tell him how he can do more and better work. Call students by name simply because they prefer it that way.

Treat minorities fairly. Making distinctions of color, race or religion is not democratic. Never, by insinuation, word, or deed, do good Americans degrade any minority.

6. *Refrain From Making Threats:* Threats are often difficult or impossible to carry out. If you persist in making threats, one day a student will call your bluff, and you will lose face by not being able to deliver. Threats not carried out soon become meaningless, and lower the students' respect for the teacher.

7. *Be Positive, Not Negative:* Employ positive procedures. Say "Do this." Avoid saying "Don't do that." An industrial-arts teacher inadvertently suggested to mischievous students how to avoid a chore by posting a sign: "Don't throw type out of the windows!" Thereafter, the type found its way to the sidewalk rather than to the type cases! It was so easy — much easier than putting it back laboriously into the type cases. Some students had not thought of the sidewalk technique until they had read the sign!

8. *Teach in Your Class — Don't Punish in It:* Even a little white rat soon learns not to enter that section of a maze where he receives an electric shock. To make a student uncomfortable, or to endure pain in a classroom will make him shy away from the seat of his discomfort. To force a student to copy several pages of poetry will hardly teach him to appreciate poetry! Avoid the assignment of schoolwork as a punitive measure. To punish one by making him complete extra assignments in school work may cause him to dislike all schoolwork.

9. *Refrain From En Masse Correction:* You multiply your disciplinary problems by punishing an entire class for the acts of a few unknown mischief makers. A frank appeal to the class for the correction of mischief will work when punishment en masse fails. The writer well re-

members the chaos resulting from a class kept after school for an hour because the teacher could not find out who drew teacher's picture on the blackboard. At long last the culprits admitted their deed, and on the way home were beaten up by irate fellow students who suffered in idle anguish for an hour on a hot afternoon. The chaos continued when the equally irate parents of the victims demanded that the principal furnish taxi transportation for their children, so they could be "safe from thugs!" Imagine the embarrassment of the teacher!

10. *Use Good Teaching Techniques:* Keep students busy, and keep them interested. If demonstrations, discussions or even the age-old "lecture" are conducted in such a way that the students cannot see or hear clearly, they will see that other interests take their attention. These other interests may take the form of horseplay.

11. *Assign No Busy Work:* Study and work must be made as interesting as possible. Practice in various techniques will show a teacher which teaching methods he can use to best advantage, and which best fit his personality and ability. Student activity cannot be reduced to the "busy work" kind just because it keeps the students occupied. The student must be sold on the work that he does. The story is told about a teacher whose regular teaching equipment was a pocketful of confetti. When he asked a student if he had nothing to do, and received an affirmative answer, he would throw a handful of confetti on the floor with the brusque order to "Pick it up!" Resentment incurred from such an order might spoil the school life of any student.

12. *Refrain From Argument:* You lower your efficiency as a teacher when you indulge in arguments with students. The "'tis-tain't" type of argument lowers your prestige and puts you on a deserved level with the student. It is unnecessary to repeat your charges. Don't lower your dignity by argument, but do give the student a right to defend himself.

13. *Be a Friend — Not a "Pal":* Friendliness should not result in overfamiliarity. A "pal" may be one who cannot instruct, lead, or discipline. The best teachers are not slapped on the back by students, called "Joe," or wrestled with. The best teachers invite respect by a dignity that does not result in their being "stuffed shirts."

14. *Discipline Is a Collective Effort:* Good discipline is an *organized* function of any school. When a poor teacher permits disorder, it is hard for students to settle down to schoolwork in other well-managed classes. They invariably want to continue their play and fun, and this works a hardship on the good teachers. Absence of a teacher from a classroom is often unavoidable. When it happens, and the class is disorderly, it is the duty of neighboring teachers to correct the disorder, and not merely to shrug and say, "My, my! Just *listen* to Miss Smith's class raise Cain!"

15. *Refrain From Using Expulsion for Correction:* Expulsion from a class or school is not a corrective measure. It is merely an easy way for a principal or a teacher to side-step a difficult disciplinary job. Good school leadership demands an understanding of children, and a child's understanding of the leader. Students should never be discouraged to the point where they abandon their education to escape penalties for the misinterpretation or disregard of relatively minor rules and regulations.

16. *Use No Informers:* Children resent being forced into the role of informers. They don't want to "snitch" on others. A good teacher solves his disciplinary problems without the aid of espionage agents.

17. *Keep Your Temper:* Do your students say, "Let's get the old boy going again today?" It is fun, not only for children, but for grownups as well, to make teacher so excited that he tears his hair over their pranks. As a matter of fact, Americans pay admission fees to see comedies based on the "quick temper" and the "slow burn." Once a teacher puts on this type of entertainment, he becomes fair game for encores. Good teachers don't get excited or let juveniles make fools of them.

From Trade to Profession

*Claude H. Ewing**

Reporting for Work

The man chosen from the trade or industrial field to become an instructor enters immediately into an entirely new world. If he is an excellent mechanic and has a chance to show his worth there is little need for thought regarding his appearance. But in consideration of the fact that new people, supervisors, and fellow teachers will pass judgment upon him, before he has a chance to affect appearances by skill, he should be sure to appear on the job properly attired.

A man who has attained a degree of efficiency in his craft, one who excels others, is very likely to be an individual who is careless about his appearance. Having observed many of these men reporting for their first job as a teacher, my first advice to such a new teacher is to seek out a good merchant tailor and spend one and one half to twice as much as was his custom on a suit of well tailored clothes. Such a suit should have trousers which reach down to the heel of the shoes, the vest should cover the belt, and the sleeves should be of proper length. These details accompanied by shirt, tie, and socks to harmonize, will give the new teacher a real start on his new job.

It is understood that there is a limit to the extent to which the new teacher should go. An example which illustrates this point is that of a young man, who was being considered for a position as an itinerant trade teacher. He appeared in a very dapper looking overcoat, derby, and spats before the committee consisting of a number of local directors. It was decided to employ him. The assistant state director and supervisor of trade and industry took the young man aside after he was informed of his acceptance, and advised him to bury the derby and burn the spats before appearing in the rural section where he was to start teaching.

Having become accepted in the school as one of the staff calls for continued personal care. The shop teacher is "on the spot." He has difficulty keeping himself clean and neat in appearance. However, the habit of shaving each morning and getting a haircut every two or three weeks along with fresh pressed clothes and shined shoes is not too high a goal to set for the man who teaches in a school shop.

In the Shop

The shop teacher has a dual personality when on the job. He is a workman and an instructor. As a workman he should dress as a tradesman. That is, according to the custom and demands of his trade. Thus equipped he can accomplish much with his pupils. They look to him for instruction which his appearance alone tells them is going to be practical instruction. Being dressed as a workman he will act as a workman. He is free to handle equipment and tools without thought of damaging his clothes.

Being dressed as a tradesman does not need to imply dirty clothes. Shop clothes laundered so as to have a fresh outfit whenever needed will accomplish as much toward influencing the youth being instructed, as the skill of performance demonstrated in explaining some operation.

The psychological effect of a clean shop suit is not only effective on pupils but also on supervisors and visitors. It is very necessary for the shop teacher to establish himself as a professional man, just as he formerly secured the opportunity to teach by excelling in his trade, and, to do this, securing the good opinion of the supervisor and other officials of the school system are important.

In most shops there is some machinery. There is, therefore, some danger involved if the clothing worn is not as it should be. If the instructor is going to demand a certain type of dress on the part of his pupils, he should also conform. All elements of danger should be considered and

*Supervisor of Curriculum, Washburne Trade School, Chicago, Ill.

the dress chosen for shop wear governed by them.

The vocational teacher has to sell himself and his subject constantly. Every youth and his parents must be sold not only when he enrolls, but frequently during his stay in the department, or his stay is short. Every request for more space, more or better equipment, materials for instruction, or change in teaching procedure calls for the instructor to turn salesman.

With a realization of this constant demand for the vocational teacher to present himself as well as his work in a favorable way, comes an understanding of the advisability of proper dress and appearance.

Even the humblest occupation can take on a professional aspect if properly presented and as the man teacher is in the transition stage, that is from occupation to profession, he is, therefore, obligated to his craft as well as to himself to pass up no opportunity for getting a little closer to his goal.

Streamlining Education

*H. T. Glenn**

Streamlining the educational system is the objective of *Post War Planning Commissions* which many progressive communities have organized. As a good educational system endeavors to create a well-rounded citizen, three or more commissions are usually organized to study the possibilities. In considering this problem, only the area of *Life Work* will be discussed.

Previous to the war many private and governmental agencies were set up paralleling the existing *Life Work* efforts of the high schools. This tendency would have eventually forced the training of youth for *Life Work* from the present educational system into many bureaucratic governmental institutions, such as the prewar NYA and CCC.

The surest way for this interference with educational progress to occur is for educational administrators to sit back and admire their part in the training of adult and youth for war jobs. The splendid efficiency of present war and army training will focus the spotlight of public attention on the relative inefficiency of prewar training methods, if these are carried into postwar times.

The use of the term *Life Work* instead of vocational education, is a deliberate attempt to involve business, distributive occupations, music, home economics, the traditional subjects, and the professions, into these plans.

The efficiency of any training program is easily measured by a survey of the graduates working in the field for which they were trained. The training of youth for life's work on the secondary level shows a remarkably small percentage of efficiency when we consider the number of students on the secondary level, and the relatively few leaving the schools trained in any life work area. It follows then, that for the average high school student, the three or four years spent in senior high school must have been spent in an exploratory manner, sampling a little here and there. Many times a course is selected because of a liking for a teacher, more often because of companions who have chosen a given class. Too frequently subjects are selected because they are considered snap courses, and therefore, easy credits toward a diploma — a diploma which carried too little significance except in the academic world, where it is the entering wedge into college. Secondary schools offer many splendid opportunities for the average person to prepare for life's work, but students lack proper guidance to make the best use of these opportunities.

Since war training has, through necessity, introduced a six weeks training period in a narrow occupational job, many administrators have come to believe that postwar training will consist of six week training periods which could logically follow the conventional high school offerings. Long term training will have to prove its right to existence. Those of us acquainted with long term vocational education need no re-evaluation of our thinking, but we must not minimize the dangers from that direction.

In the interest of a more efficient *Life Work Training Program*, the following is suggested as a workable educational experiment. Constructive criticisms are welcome.

The essence of the plan is guidance, exploration, vocational training, and placement. While the objectives and sequence are not radical, the method of enforcement is.

The philosophy of the elementary schools becomes basic education, plus broad vocational guidance during the last year. A vocational job psychologist is the key to the guidance program in the elementary level. Scientific testing should determine some of the broad fields of ability of the youngster, and it should also determine some of his negative abilities. The records of elementary school work, plus the knowledge and desires of the parents, together with the testing results, should provide a wonderful opportunity for a skilled job psychologist to determine the life work possibilities of the youth.

This decision must be made with the parents, student, and psychologist together in a conference. On the basis of a two hour conference per student, one psychologist could handle 500 students per year and still have forty minutes per student for testing and co-ordination surveys. Some may say that no tests are accurate at this age, but if the need arises, accurate tests will follow. If need be this program could be moved up into the first year of the junior high school.

The junior high school must be explorative in the two hours allowed for the life work program. All subject matter in this area must be made to include as many occupations as is possible. The record of the youngster and his reaction to the subjects required for his life's work area, should prove extremely valuable to the guidance counselor for the purpose of checking, and revising if need be, the judgment of the job psychologist. Teacher observation and complete testing will be of paramount importance if accuracy is to be obtained.

The senior high school now takes on the character of a real vocational school during the two or three hours allowed for the life work courses. The placement bureau, in cooperation with the advisory committees, must set up departmental life work curriculums based upon the placement bureau's occupational survey of existing opportunities in that community. The actual courses of study can be set up by the same group, plus the help and advice of the teachers and administrators concerned.

Such a program should show a greater percentage of students who know what they want from the schools, and the schools will know just what subjects each type of work requires. Very definite programs can be laid out for the student. A three year concentration on a real life work training program should graduate many more *better prepared* people to take their place in our present complicated society. Work experience ought to be provided at the beginning of the senior high level as a check on guidance and to provide the employment bureau with a grade, from industry or business, to indicate his employability.

Many will decry this method as robbing the youngster of his traditional democratic freedoms. There is nothing compulsory about the program, as the student or parent can change it at any time. The counseling is advisory in nature and takes into account the judgment of the parents and psychologist. Results certainly should be much more accurate than the immature judgment of the youngster upon which we rely today.

While we recognize the impossibility of

*David Starr Jordan High School, Long Beach, Calif.

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training for every occupation in our complicated civilization, the schools must remain broad in some occupational areas while eliminating some altogether. It will be the job of the advisory committees and employment bureau to determine the training fields and the amount of training necessary. Levels of achievement should be determined for the various levels of occupational skills, so that the most students will be placed initially upon their proper employment level of ability.

The junior college and university continue in line with the same policy, training in the more skilled life-work areas where three years of high school is not enough.

On the basis of a well rounded citizen it would be better to bring the vocational schools back into the fold of the high schools, where the civic and social side of the student could be better administered. The elimination of the dumping of *undesirables* into the vocational schools would help to remove some of the class consciousness from the learning of trades, which the segregation of these two groups fostered.

In order to put some worth-whileness to this program, the traditional report card must be superseded by an achievement record, which would contain all of the grades of the student in school and be used as the basis of employment by the employment bureau.

The achievement record makes the life work program real and worth while to the student. Much discussion exists as to just what should appear on the record. In order to avoid the objections of teachers already burdened with work, it must be simple. In addition to scholarship and citizenship grades, it should contain a grade in *employability*, or as some suggest, *responsibility*. Everyone agrees as to the value of the achievement record, especially the academic teachers, who recognize in it a very useful tool for putting more value into the academic subjects.

The placement bureau is the real key to the entire program. It gives the student an understanding of the real significance of the work done by the school. This bureau keeps records on the operation of the entire program. By contacting graduates, and tabulating reasons for their labor shifts, the guidance program can easily be checked. Constantly surveying the labor scene by virtue of placements, the bureau is always in a position to recommend curriculum changes based upon actual statistics. The success of the guidance program can be statistically proved and recommendations made to the job psychologist.

The placement bureau will be the connecting link between business, industry, and education. It should help to bring these natural partners of our social order more closely together. The success of the entire program depends upon the placement bureau gaining the confidence of business and industry so that the achievement record will be a recognized recommendation by both student and business world.

Teaching Materials for Industrial Education

*Chris H. Groneman**

(Continued from page 415 of the December, 1944, issue)

The following list of teaching aids was collated to help the teachers of the various departments of industrial arts and vocational education.

Many of the booklets and articles contained in this list have cost those who distribute them quite an appreciable amount of money. It is but courtesy to enclose sufficient postage with your request to cover mailing charges.

It is advisable that teachers use school stationery when writing for any of the items listed. All items are free unless otherwise noted. In most cases a small charge is made when free items are ordered in quantities.

Metals

Abrasive Company, Division of Simonds Saw & Steel Co., Tacony and Fraley Sts., Philadelphia 37, Pa.
- *Grinding Wheel Data Book*
- *The Use, Care, and Protection of Abrasive Wheels* — Safety Code Revised Sept., 1943
- *Mounted Wheels and Mounted Points Including Victory Points* — Form ESA 67

Adams Co., Dubuque, Iowa
- *Treatise on Hobbing Helical Gears*
- *A Treatise on Machine Molding*

Aluminum Company of America, 801 Gulf Bldg., Pittsburgh 19, Pa.
- *Alcoa Aluminum and Its Alloys*
- *Aluminum Casting Alloys*
- *Aluminum in Aircraft*
- *Aluminum in the Chemical Industry*
- *Aluminum — Its Story*
- *Aluminum Paint Manual*
- *An Outline of Aluminum*
- *Finishes for Aluminum*
- *Forming Aluminum*
- *Machining Alcoa Aluminum*
- *Riveting Aluminum*
- *Structural Aluminum* — $1.25 (special price to engineering students — 75c)
- *Welding and Brazing Alcoa Aluminum*
- *Chart on Chemistry and History of Aluminum*
- *Machining Chart*
- *Welding and Brazing Chart*
- *Alcoa Global Map*
  (For copies of this map write to Alcoa Map Department, P. O. Box 52, New York 8, N. Y.)

Aluminum Cooking Utensil Co., 5th Ave. & 11th St., New Kinsington, Pa.
- *Institutional Utensils*
- *Wear Ever Steam Jacketed Kettles*
- *Correct Use and Care of Aluminum Utensils*
- *Aluminum — Its Story*

American Handicrafts Co., 193 William St., New York 7, N. Y.
- *Catalog of Craft Supplies*
- *The Finishes of Iron*
- *Instructions for Etching*

American Institute of Steel Construction, Inc., 101 Park Ave., New York 17, N. Y.
- *Applications of Structural Steels and Light Weight Alloys for Bridges and Similar Structures* by F. H. Frankland — *No. 194*
- *Code of Standard Practice for Steel Structures Other Than Bridges — No. 132* — 10c
- *Engineering Essentials for Welders — No. 184*
- *An Investigation of Steel Rigid Frames* by Inge Lyse and W. E. Black — *No. 160*
- *Lantern Slide Index Booklet — 1939 — No. 137*
- *The Preparation of Structural Steel Surfaces for Painting — A.I.S.C. Convention Proceedings, 1940 — No. 162*
- *Specification for the Design, Fabrication and Erection of Structural Steel for Buildings — No. 131* — 10c
- *Steel Is Better! 15 Exclusive Reasons Why You Should Build With Steel — No. 115*
- *The Welding of Steel — No. 150*

American Welding Society, 33 West 39th St., New York 18, N. Y.
- *Standard Qualification Procedure* — 40c
- *Welding Symbols and Instructions for Their Use* — 25c
- *Definitions of Welding Terms and Master Chart of Welding Processes* — 40c
- *Standard Methods for Mechanical Testing of Welds* — 40c
- *Code of Minimum Requirements for Instruction of Welding Operators (Part A — Arc Welding of Steel)* — 50c
- *Tentative Specifications for Iron and Steel Arc Welding Electrodes* — 25c
- *Tentative Specifications for Iron and Steel Gas Welding Rods* — 25c
- *Tentative Specifications for Aluminum and Aluminum Alloy Metal Arc Welding Electrodes* — 25c
- *Tentative Standards and Recommended Practices and Procedures for Spot Welding of Aluminum Alloys* — $1

*Industrial Education Department, A. & M. College of Texas, College Station, Tex.

Recommended Practice for the Spot and Seam Welding of Low Carbon Steel — 10c
Code for Arc and Gas Welding in Building Construction — 50c
Specifications for Welded Highways and Railways Bridges — $1; to members of society for 75c
Rules for Field Welding of Steel Storage Tanks — 25c
Rules for Fusion Welding Steam, Oil or Air Piping in Marine Construction — 25c
A.W.W.A. — *A.W.S. Standard Specifications for Elevated Steel Water Tanks, Standpipes and Reservoirs* — 30c
Recommended Practices for Inspection of Fusion Welding — 40c
Report on Thermal Stresses and Shrinkage in Welded Ship Construction — 25c
Structural Failures in Welded Ship Construction (Report) — 25c
Reports of Structural Steel Committee: Welded Structural Joints — Test Results and Committee Recommendations — 25c
Investigation of Welded Seat Angles — 25c
Welded Beam-Column Connections — 25c
Inspection Method Used in Manufacture of U–69 and U–70 Pressure Vessels — 10c
Filing Classification of Welding, Brazing, Soldering and Cutting Processes, Materials and Applications — 50c
Engineering Essentials for Welders — 25c
Qualifying Welding Operators for Important Work — 10c
Recommended Procedure to Be Followed in Preparing for Welding or Cutting Certain Types of Containers Which Have Held Combustibles — 25c
Safe Practices for Installation and Operation of Oxy-Acetylene Welding and Cutting Equipment — 25c
National Safety Council Safe Practice Pamphlets —
No. 23 — *Gas Welding and Cutting* — 25c
No. 105 — *Electric Welding* — 25c
Health Aspects of the Oxy-Acetylene Process — 25c
Health Hazards of Electric and Gas Welding — 25c
Oxy-Acetylene Cutting — 25c
Oxy-Acetylene Welding and Its Applications — 25c
Miscellaneous Uses of the Oxy-Acetylene and Air-Acetylene Flames — 15c
Sample Pipe Welding Specifications — 10c
Tests for the Selection of Welding Operators — 20c
Bronze Welding or Brazing of Iron and Steel by the Oxy-Acetylene Process — 20c
The Effect of Flame Cutting on Steel — 25c
Hard-Facing by the Oxy-Acetylene Process — 25c
Flame Hardening by the Oxy-Acetylene Process — 20c
Training Oxy-Acetylene Welding and Cutting Operators (Instructor's Outline) — 25c
Practical Design of Welded Steel Structures — $1
Welding Handbook — members $5; to nonmembers $6
Welding Metallurgy — $1.50
Resistance Welding Manual — $2.50
How to Weld 29 Metals — 85c
Arc Welding Handbook — $2 plus postage
Welding and Its Application — $2.50 plus postage
Electronic Control of Resistance Welding — $4 plus postage
Lessons in Arc Welding — 50c in U. S.; 75c elsewhere
Practical Ship Production — $3 plus postage
The Instructor of Steel Arc Welding — $3 plus postage
Training of Welding Operators:
Oxyacetylene Welding (lectures) — $1 plus postage
Oxyacetylene Welding (exercises) — $1 plus postage
Arc Welding (lectures) — $1 plus postage
Arc Welding (exercises) — $1 plus postage
Aircraft Welding (exercises) — 50c plus postage
A.S.M.E. Code for Unfired Pressure Vessels — $2
Research Supplements of Welding Journal — 50c per issue
Bound Volumes Welding Journal — members — $6 plus postage; to nonmembers — $7 plus postage
Individual Copies Welding Journal — members — 50c per issue; to nonmembers — 75c per issue
Procedure Handbook of Arc Welding Design and Practice — $1.50 plus postage
Welded Steel Construction — $3 plus postage
Arc Welded Steel Frame Structures — $5 plus postage

Armour and Co., 1355 W. 31st St., Chicago 9, Ill.
Coated Abrasives

Armstrong Bros. Tool Co., 317 N. Francisco Ave., Chicago, Ill.
Catalog C–39
Set of Charts

Atlas Press Co., North Pitcher St., Kalamazoo 13 D, Mich.
General Products Catalog
Manual of Lathe Operation — 85c
Machine Shop Practice Wall Charts (6 charts) — 25c per set

Behr-Manning Corp., Troy, N. Y.
1. *A Lecture Course on Coated Abrasives*
2. *Blueprint for Faster, Better Production*
3. *Basic Information for the User and Buyer*
4. *Hand Stoned Cutting Tools for Faster, Better, More Cuts*
5. *Coated Abrasives for Finishing Metal* (chart exhibit)
6. *Industry's Woodworking Abrasives* (chart exhibit)
7. *How to Sharpen*
8. *Sandpaper — Its How and Why*
9. *Coated Abrasives for the Machine Shop — Project 1*
10. *Oilstones Used in the Machine Shop — Project 2*
11. *Coated Abrasives for Woodworking — Project 3*
12. *Coated Abrasives for Woodworking — Project 4*
13. *The Use of Oilstones — Project 5*
14. *Sanding and Finishing Model Airplanes — Project 6*
15. *Coated Abrasives for Metal Preparation — Project 7*
16. *Coated Abrasives for Metal Finishing — Project 8*
17. *Hand Stoned Cutting Tools — Project 9*

Note: Items 1 to 6 — Single copies available to instructors only
Items 7 and 8 — 25 copies of each available for school or shop library
Items 9 to 17 — Available to instructors in whatever quantity they need

Bethlehem Steel Co., Bethlehem, Pa.
Tool Steel Treaters' Guide
Better Roofs of Steel
Your Land — A Handbook of Methods for Preventing and Curing Soil Erosion

Black and Decker, Electric Tool Headquarters, Towson 4, Md.
The Portable Electric Drill
Portable Electric Hammer Handbook
Portable Electric Saw Handbook
The Principles of Valve Reconditioning
They Used Their Heads
Portable Electric Tools Catalog

Blackhawk Manufacturing Co., 5325 W. Rogers, Milwaukee 1, Wis.
Meet the Mechlins
Wrench Catalog
Hydraulic Equipment Catalog
Blueprints

Brown & Sharpe Mfg. Co., Providence, R. I.
Universal Bevel Protractor Readings
Decimal Equivalents (chart)
Vernier Readings (chart)
Micrometer Readings (chart)
Micrometer Caliper, Sectional View (chart)
Brown and Sharpe Tools (chart)
Micrometer Caliper Pamphlet
Vernier Pamphlet
Decimal Equivalent Card — Pocket Size
Tap Drill Card — Pocket Size
Small Tool Catalog No. 34
Note: Above items available only to teachers who have definite use for them. Make request on school stationery.

The Bullard Co., Bridgeport 2, Conn.
Bullard Spiral Drive and Cut Master Types of Vertical Turret Lathes and Mult-au-matics — Catalogs
Operator's Handbook — catalog — *Spiral Drive and Cut Master Types of Vertical;* also *Mult-Au-Matic Turret Lathes*
The Mult-au-matic Method

Carboloy Co., Inc., 11198 E. 8-Mile Rd., Detroit, Mich.
General Tool Catalog (No. GT–175)
Carboloy Tool Manual (No. GT–133–R)
Grinding Cemented Carbide Milling Cutters (No. GT–127)
Grinding Procedure for Milling Cutters (chart)
Grinding Procedure for End Cutting Tools (chart)
Note: The last three items are available as one unit.

The Carborundum Co., P. O., Box 337, Niagara Falls, N. Y.
Natural Color Educational Chart 24 by 36 in. — Form A–968
The Romance of Carborundum
Abrasives in the Service of Industry
Causes and Corrections of Common Grinding Errors
Carborundum Grinding Bulletins (25 bulletins to a set on the following subjects):
The Abrasive Tools of Industry
What a Grinding Wheel Does
Standard Grinding Wheel Shapes
The Grinding Wheel as a Production Tool
Classes of Grinding Operations
Wheel, Work and Machine Movements I and II
Stresses Due to Wheel, Work and Machine Movements
Stresses Due to Contact Between Wheel and Work
The Disposal of Chips
Grinding Wheel Safety
Wheel Balancing
Dressing and Truing Tools
Dressing and Truing Procedures
Wheel Marking Symbols
Center Type Cylindrical Grinding I and II
Centerless Type Cylindrical Grinding I and II
Surface Grinding

Internal Grinding
Cutting Off
Snagging and Offhand Grinding
Causes and Corrections of Common Grinding Errors
Coated Abrasives
Polishing Grains
Abrasives in the Service of Industry (chart)

J. I. Case Co., Racine, Wis.
From a Bar of Raw Steel

Chicago Rivet & Machine Co., 9600 West Jackson Blvd., Bellwood, Ill.
Rivet Literature
Apex Brake Reliner Catalog Page
Aircraft Automatic Rivet Setters Catalog

Chicago Steel Service Co., Ashland Ave. at 39th St., Chicago, Ill.
Shop Notes on the Machining of Stainless Steel
The Welding of Republic Enduro Stainless Steel
The Fabrication of Republic Enduro Stainless Steels
The House of Stainless

Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio
L-Type Milling Machine (chart)
Dial Type Milling Machines (chart)
1–12 and 1–18 Plain Automatic Milling Machines (chart)
2–18 and 2–24 Rise and Fall Automatic Milling Machines (chart)
2–18 and 2–24 Plain Automatic Milling Machines (chart)
No. 0–8 Plain Automatic Milling Machine (chart)
12-in. Hydraulic Universal Grinding Machine (chart)
6-in. and 10-in. Saddle Type Hydraulic Grinding Machines (chart)
No. 2 Cutter and Tool Grinder (chart)
No. 2 Centerless Grinding Machine (chart)
Milling Machine Practice — 10c
Milling With High Speed Steel — 10c
Physics of Metal Cutting — 10c
Chip Formation, Friction and Finish — 10c
An Analysis of the Milling Process
Cutting Gear Teeth on a Milling Machine
Explaining the Centerless Principle With Wood Model
Principles of Centerless Grinding — 10c
Precision Cylindrical Grinding — 10c
A Review of the Grinding Theories
The Use of Abrasives for Removing and Finishing Metals
Filmatic
Cutter Sharpening Practice — 10c
Machining With Single Point Tools
Maximum Steel Production
Hydraulic Control and Feeding Mechanisms for Machine Tools — 10c
Lubrication of Cincinnati Milling, Grinding, Broaching, Lapping and Cutter Sharpening Machines — 10c
High-Speed Milling With Negative Rake Angles by Hans Ernst
Cutting-Angle Relationships on *Metal Cutting Tools* by M. Kronenberg

The Cincinnati Shaper Co., Hopple, Garrard and Elam, Cincinnati, Ohio
Shapes for Sky Ships
Wings of Metal
Shears and Press Brakes in Aircraft Sheet Metal Fabrication
Pressures and Blanks for Press Work
Fundamentals in Die Use
The Press Brake
Precision Shearing
Light Beam Shearing Gauge
Special Slide Rules
Industrial Education Bibliography
Cincinnati All Steel Shears
Cincinnati Press Brakes With Engineering Data
Shapers
Rapid Traverse Shapers (chart)
Shaper Set-ups
Training Bulletins on Planing

The Cincinnati Tool Co., Norwood, Cincinnati 12, Ohio
General Tools Catalog

Clemson Bros., Inc., Middletown, N. Y.
Metal Cutting With Star

The Columbian Vise & Mfg. Co., 9021 Bessemer Ave., Cleveland 4, Ohio
For Proper Vise Care (chart) and 3-ring notebook

Delta File Works, Inc., Philadelphia, Pa.
Files, How to Select, Use and Conserve Them — 25c

Douglas Machinery Co., Inc., Westinghouse Bldg., 150 Broadway, New York 7, N. Y.
Rotorex Universal Tool and Cutter Grinder Operating and Maintenance Instructions for Douglas Precision Slotters
Douglas Precision Miller
Douglas Precision Slotters

Dow Chemical Co., Midland, Mich.
Stripcoat
Magnesium Alloys
Styraloy 22

Electro Metallurgical Co., 30 East 42nd St., New York 17, N. Y.
4345 Stainless Steels in Aircraft
3371 Use of Stainless Steel in Hospitals
2227–B Stainless Steels and Their Uses
4209 Vanadium in Steel and Iron
2165–C Electromet Products and Services
3465–A Briquetted Alloys for the Cast Iron Foundry
Note: Above items are available only to instructors or educational institutions

The Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Operator's Handbooks:
The Internal Gear — 29c
The Involute Gear — 18c
6-Type Gear Shaper — 30c
6A-Type Gear Shaper — 20c
7-Type Gear Shaper — 30c
The Fellows Method (general catalog) — 60c
Involute Measuring Machines — 50c
Circulars (10c each):
6-Type Gear Shaper
6A-Type Gear Shaper
7-Type Gear Shaper
7A-Type Gear Shaper
30-Type Gear Shaper
LS-Type Gear Lapping Machines
Horizontal Z-Model Gear Shaper
Nos. 4, 8, 12, 18, and 24 Gear Shaping Machines
8M Red Liner
20M Red Liner
3-60 Rack Shaper
4S Helical Cutter Sharpening Machine
4B Gear Burnishing Machine

Fosdick Machine Tool Co., Sta. A., Cincinnati 23, Ohio
Jig Borer
High Speed Drills
Hydraulic Radials
Drilling Speed Charts
Drilling Calculator
Set of Blueprints

Gisholt Machine Co., 1245 E. Washington Ave., Madison 3, Wis.
High-Spot General Line Catalog

Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
The New House of Science
Literature and Booklets on Steel Tubing

Handy & Harman, 82 Fulton St., New York, N. Y.
Low Temperature Brazing of Metals With Sil-Fos and Easy-Flo, Bulletin 12A

Heller Bros. Co., 865 Mt. Prospect Ave., Newark 4, N. J.
Every Type of File for Any Kind of Work (color chart)

Higgins Aircraft, Inc., P.O. Box 32, New Orleans 6, La.
Aircraft Sheet Metal Work Units for Training
A Practical Course in Aircraft Sheetmetal
Basic Fundamentals of Aircraft Metal Work

Hobart Bros. Co., Hobart Square, Troy Ohio
Practical Arc Welding (a textbook) — $2
Lessons in Practical Arc Welding — 75c
Welder's Vest Pocket Guide
Simplified Arc Welding Catalog
Practical Design for Arc Welding, Volume 1 — $3.50

Inland Steel Co., 38 So. Dearborn St., Chicago 3, Ill.
At the Hub of the Lakes
The Snow Cruiser
Inland Steel — A Century of Progress
Inland Steel at Work in Industry

International Acetylene Assoc., 30 East 42nd St., New York 17, N. Y.
Oxy-Acetylene Cutting — 25c
Oxy-Acetylene Welding and Its Applications — 25c
Miscellaneous Uses of the Oxy-Acetylene and Air Acetylene Flames — 15c
Welding Codes and Specifications — 15c
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Tests for the Selection of Welding Operators — 20c
Bronze Welding or Brazing of Iron and Steel by the Oxy-Acetylene Process — 20c
The Effect of Flame Cutting on Steel — 25c
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Safe Practices for Installation and Operation of Oxy-Acetylene Welding and Cutting Equipment — 25c
Flame-Hardening by the Oxy-Acetylene Process — 20c
Training Oxy-Acetylene Welding and Cutting Operators — Instructor's Outlines Including Outline Course for Inspectors — 25c

Johnson Gas Appliance Co., Cedar Rapids, Iowa
Catalog No. 43 — Johnson Gas Furnaces for Every Industrial Purpose

Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.
Celluloid Speed Chart
Milwaukee Arbors
Milwaukee Milling Machines
Milwaukee Milling Machine Catalog
Milling Machine Instruction Book

Kempsmith Machine Co., 1819 South 71st St., Milwaukee 14, Wis.
Milling Machines (catalog)

Koebel Diamond Tool Co., 9456 Grinnell Ave., Detroit 13, Mich.
The Story of the Perfect Octahedron
The Fable of the Tough Beard and the Dull Razor
For Grinder Men Only

Landis Machine Co., Inc., Waynesboro, Pa.
Operator's Instruction Book
Landis Hand Book
Landis Threading Machinery

Landis Pipe Threading Machinery
Thread Tips
Bolt Threading Machinery Catalog
Pipe Machinery Catalog

R. K. LeBlond Machine Tool Co., Madison & Edwards Rds., Cincinnati, Ohio
Running a Regal — 25c
Manual of Tool Room Grinding — 25c
Regal Lathe by LeBlond (color chart)

Linde Air Products Co., 30 East 42nd St., New York 17, N. Y.
F-2013-F Oxy-Acetylene Welding and Cutting
3382-A Preventing Welding and Cutting Fires
5082-A Study Assignments for Training Welders and Cutting Operators
4728 Training Oxy-Acetylene Welding and Cutting Operators
5344-A Brazing Tool Bits to Shanks
4627-B Simple Templet for Marking Cuts on Pipe
4435-C Sheet Metal Welding Fundamentals
4630-A Adapting Your Hand-Cutting Blowpipe for Machine-Cutting Accuracy
5232 Fusion Welding Cast Iron
4592-A A Home Made Pipe Cutting Machine
5113 A Procedure Control for Aircraft Welding
5106 The Fabrication and Repair of Farm Equipment
5165-A How to Set Up and Operate Welding and Cutting Equipment
4680 How to Increase Efficiency in Hand Cutting Operations
4453-A How to Repair White Metal Grilles
4328-A How to Bronze Weld
4782 How to Repair Broken Automobile Bumpers
5076 How to Safe End Hammer Struck Tools
4645-B Instruction Outline for Welding Steel
4200-A Oxy-Acetylene Heating for Bending, Straightening and Forming
4971-A Shop Equipment That You Can Make
3491-C Steel Hard Face Procedure
5144-A Correct Procedures vs. Common Faults in Hand Cutting (chart)
4742 Quick Easy Method of Hard Facing Plow Shares With Haystellite Tube Rod
4666 Identifying Metals by Spark Testing (chart)
2299-D Simple Tests for Identifying Metals by Appearance, Chip Test, and Blowpipe Test (chart)
4430 The Oxy-Acetylene Handbook — $1.50
4062-C Opportunities for Profits With Portable Machine Cutting
5078 Oxy-Acetylene Groove Cutting Booklet
2035-M Precautions and Safe Practices
5095 Lengthening the Life of Wearing Parts With Bronze Cast Iron and Steel Welding Rods (chart)
5096 Lengthening the Life of Wearing Parts With Hard Facing Material
4464-A Recommended Welding Methods, Flame Adjustments, etc. (chart)
5709 Newer Aliphatic Chemicals for Industry
5526 Synthetic Rubber Production at Institute of West Virginia
Note: Above items are available only to instructors or educational institutions.

Lufkin Rule Co., Saginaw, Mich.
Lufkin Precision Tool Catalog No. 7
Lufkin General Catalog No. 12C
Decimal Equivalents (chart)
Tap and Threading Chart
Micrometer Caliper Chart

Macklin Co., Jackson, Mich.
Helpful Hints and Safety Suggestions
Grain and Grade Recommendations
Grinding Wheel Facts
Thread Grinding Problems

Magnaflux Corporation, 5900 Northwest Highway, Chicago 31, Ill.
Bolt and Nut Inspection by the Magnetic Particle Method by W. E. Thomas and Taber de Forest
Detecting Surface Flaws in Non-Ferrous and Non-Magnetic Materials by Greer Ellis
Magnetic Inspection of Welds by T. B. Jefferson
Principles of Magnaflux Inspection by F. B. Doane — $2.50
Magnaflux Aircraft Inspection Manual by F. B. Doane and W. E. Thomas — $1.75

Michigan Seamless Tube Co., South Lyon, Mich.
How to Spot and Stop Defects
Cold Drawn Seamless Steel Tubing
Weight Tables of Round Seamless Steel Tubing
Chart of Standard Sizes of Alloy Seamless Steel Aircraft Tubing
Tube Tips (company magazine)

Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn.
Three-M Abrasive Specialty Items
Three-M Method of Grinding and Polishing
Three-M Products Used in the Victory Program

Modern Engineering Co., 3411 Pine Blvd., St. Louis, Mo.
Everything for Welding — Catalog No. 110
MECO No. 1 Service Bulletin — Elementary Instruction on Welding and Cutting — 50c

Morse Twist Drill & Machine Co., New Bedford, Mass.
Machinist's Practical Guide (single copies free; quantity lots sold at 10c per copy)
Catalog No. 75
Note: Above items available only to superintendents, principals, and teachers when requested on school letterheads.

Mummert-Dixon Co., Hanover, Pa.
Mummert-Dixon Equipment Literature

Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.
Catalog No. 94 — Machines and Tools for Sheet Metal Working
No. 200 booklet — Niagara Machines and Tools for Sheet Metal Shops
Niagara No. 103-C Vocational Bulletin — School Equipment and Floor Plans for Sheet Metal Classes

Nicholson File Co., Providence, R. I.
File Filosophy
Nicholson Wall Charts

O'Neil-Irwin Mfg. Co., 316 Eighth Ave. S., Minneapolis, Minn.
Die-Less Duplicating

Peck, Stow & Wilcox Co., Southington, Conn.
Pexto
Bulletin No. SB-35
Catalog No. 139

Peerless Machine Co., 1600 Junction Ave., Racine, Wis.
Catalogs Covering High Speed Metal Cutting Sawing Machines, Nos. 52, 51A, 53, HC50
Catalog of Pipethreading Machines
Operating Instructions Covering High Speed Metal Cutting Sawing Machines

Porter-Cable Machine Co., Syracuse, N. Y.
A New Precision Machining Method

Racine Tool & Machine Co., 1760 State St., Racine, Wis.
Descriptive Literature on Power Metal Cutting Machines
Catalogs on Power Metal Cutting Machines

Revere Copper and Brass Incorporated, 230 Park Ave., New York City
Paul Revere Historical Prints (set of four)

Rivett Lathe & Grinder Inc., Brighton 35, Boston, Mass.
Bulletin 500-A

The Ruby Chemical Co., 68 McDowell St., Columbus, Ohio
Ruby Catalog and Descriptive Folders

The William Schollhorn Co., P.O. Box 1944, New Haven, Conn.
Illustrated Catalog

Sciaky Bros., 4915 W. 67th St., Chicago 38, Ill.
Machine Bulletins:
No. 101-C — Type PMCO. 2S31 Press Type Spot Welder (Stored Energy)
No. 105-B — Type PMCR. 2S31 Rocker Arm Type Spot Welder (Stored Energy)
No. 106-A — Type PMCO. 1-11 A. C. Press Type Spot Welder
No. 112-A — Type PMCR. 0-1 A. C. Rocker Arm Type Welder
No. 103-A — Type P-1-R Radial Portable a.c. Welder
Accessory Bulletins:
No. 201-A — Dynatrol Current Interrupting Device
No. 201-B — Dynatrol Current Interrupting Device (detailed description)
No. 202-A — Electronic Timer Type 2-9
No. 202-B — Electronic Timer Type 2-23
No. 203-A — Locating Spotlight
No. 205-A — Electro-Valve

Sheldon Machine Co., Inc., 4240 N. Knox Ave., Chicago 41, Ill.
Sheldon Lathes, Attachments and Accessories
The Care and Operation of Lathes — 50c

Smooth-On Mfg. Co., 568 Communipaw Ave., Jersey City 4, N. J.
Smooth-On Handbook

Snap-On Tools Corp., Kenosha, Wis.
General Catalog

South Bend Lathe Works, 425 E. Madison St., South Bend, Ind.
How to Run a Lathe — 25c
The South Bend Machine Shop Course — 50c
Catalog No. 100-C
Blue Print Wall Charts
Wall Chart SP250 — How to Become a Machinist — 10c
Wall Chart SP777 — Decimal Equivalents — 10c
Wall Chart SP175 — Principal Parts of Lathe — 10c
Keep Your Lathe Clean — Bulletin H-1
Oiling the Lathe — Bulletin H-2
Leveling the Lathe — Bulletin H-3
How to Cut Screw Threads in the Lathe — Bulletin 36A — 10c
How to Grind Lathe Tool Cutter Bits — Bulletin 35 — 10c
Keep Your Lathe in Trim — Bulletin H-4

The L. S. Starrett Co., Athol, Mass.
Starrett Precision Tool Catalog
How to Read a Micrometer Caliper
The Starrett Book for Student Machinists — 75c
The Starrett Educational Set — 10c

Useful Information for Students and Apprentices

Sterling Wheelbarrow Co., 7036 W. Walker St., Milwaukee, Wis.
Sterling Foundry Catalog

Stewart Industrial Furnace Div., Chicago Flexible Shaft Co., 5600 W. Roosevelt Rd., Chicago 50, Ill.
Pointers on Keeping Your Industrial Furnaces in AA-1 Condition (chart)
Stewart Steel Specifications and Heat Treating (chart)
Stewart Vest Pocket Data Book
Stewart Handbook
Guide to Selection of Industrial Furnace Reprint

The Turner Brass Works, Sycamore, Ill.
Know Your Blow Torch Wall Chart
No. 3 Torchy Theatre — More Mending Means Less Spending (chart)
No. 4 Torchy Theatre — For Long Use, *Don't Abuse* (chart)
No. 2 Torchy Theatre — A Clean Torch Never Delays (chart)
No. 1 Torchy Theatre — Well Begun Is Half Done (chart)

United States Electrical Tool Co., 1050 Findlay St., Cincinnati 14, Ohio
Grinders, Buffers, and Dust Collectors
Electric Tools

The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Turret Lathe Operator's Manual — $1
Ideas on Grinding and Setting Cutters
Blue Chips
Know Your Turret Lathe
Better Performance From Single Cutter Bar Turners
Turret Lathe Cutting Speed Calculator
Cutter Grinding Gauge
Bar Turner Cutter Grinding Gauge

Joseph Weidenhoff, Inc., 4340-58 Roosevelt Rd., Chicago 24, Ill.
Handbook of Engine Maintenance
Operating Manual of Model 701 Growler
Operating Manual of Model 500 and 501 Generator Test Bench
Operating Manual of Model 341 Magnescope
Operating Manual of Model 1057, 58, 59, and 60 Distrib-U-Scope
Operating Manual of Model 1019 Analyzer
Operating Instructions of Model 967 Puller Press
Operating Instructions of Model 973 Ratchet Pole Shoe Screw Driver
Operating Instructions of Model 963 Undercutter
General Catalog

J. H. Williams & Co., Buffalo 7, N. Y.
"How and Why" Tool Data Sheets
Booklet — "How to Select and Use Wrenches"

Problems and Projects

SOLDERING COPPER FURNACE

C. F. ZAENGLEIN
High School
Circleville, Ohio

Several years ago our general metal shop was in need of soldering furnaces, so we decided to design and build them. Time has proved the furnaces to be very satisfactory.

The construction of the furnace is very simple and the material is obtainable at any junk yard or plumbing shop at a nominal cost.

The process of construction was quite interesting to our students because it involved many common tool operations, such as cutting, sawing, drilling, and forming the metal and assembling the project. Some of the students were so thrilled after testing the project by actual use, that several of them made extra ones for their own use in their home shops.

Method of Procedure

1. Cut out a 1 by 5-in. slot into the 3-in. pipe as shown at C in Figure 1. This can be done by drilling a succession of holes and then filing the edges smooth.

2. Cut out the retainer sleeve using 26 or 28-gauge black iron. A piece, 5½ by 7 in., will be required to form the sleeve shown at A in Figure 1. This sleeve is inserted in the 3-in. pipe and slipped into the slot as shown in front view at A. The purpose of this sleeve is to keep the heat and burnt gas from escaping at the bottom of the 3-in. pipe.

3. The two standards of the furnace should be made of ⅛ by ¾ by 26-in. flatiron. They are formed to fit around the 3-in. pipe at each end and also around the ¾-in. pipe, and are held in place by four 3/16-in. stove bolts, as shown in the sectional view A-A, Figure 1.

4. The rest for the handle of the soldering copper is constructed of a piece of ⅛ by ¾ by 18-in. flatiron. It is formed as shown in the end view of the furnace. A bolt, 3/16 by 3½ in., serves as a rest for the soldering copper.

5. The gas jet is made out of a piece of ¾ by 10-in. black iron pipe. Slots are sawed into the pipe about 3/16 in. apart to the depth of about half the diameter of the pipe. One end of this pipe is threaded for the pipe cap; the other end need not be threaded, as it should slip into the gas mixture valve which makes it easier to remove for cleaning.

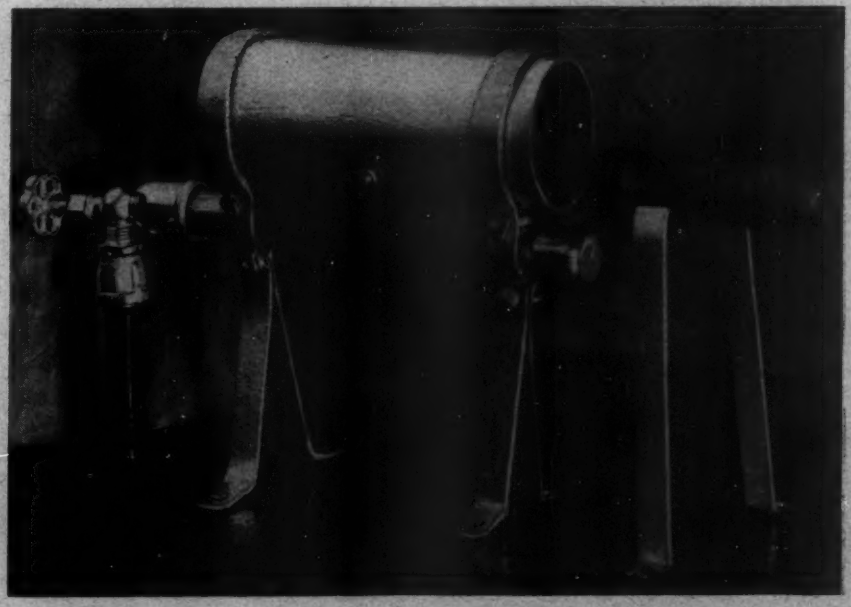
6. A circular piece of sheet metal may be cut out to fit in the back of the 3-in. pipe to help retain the heat if so desired. This is not shown in the drawing.

7. The gas valve may be purchased at any plumbing shop. It should be similar to the ones used in ordinary hot plates, and have an air mixer.

8. The completed unit may be finished with aluminum paint which is heat resisting and gives the furnace a bright finish.

Crime is usually an economic manifestation. People are tempted to take when they don't have, but if we can open up the way to right living, if we can keep the economic side well ordered and just, we will have gone far toward righting many wrongs. — *Dr. R. L. Cooley.*

More than 12,000,000 board feet of pressure-treated timber was used in building the Alaskan highway. — *American Forest Products Industries, Inc., Washington, D. C.*



Gas fired soldering furnace

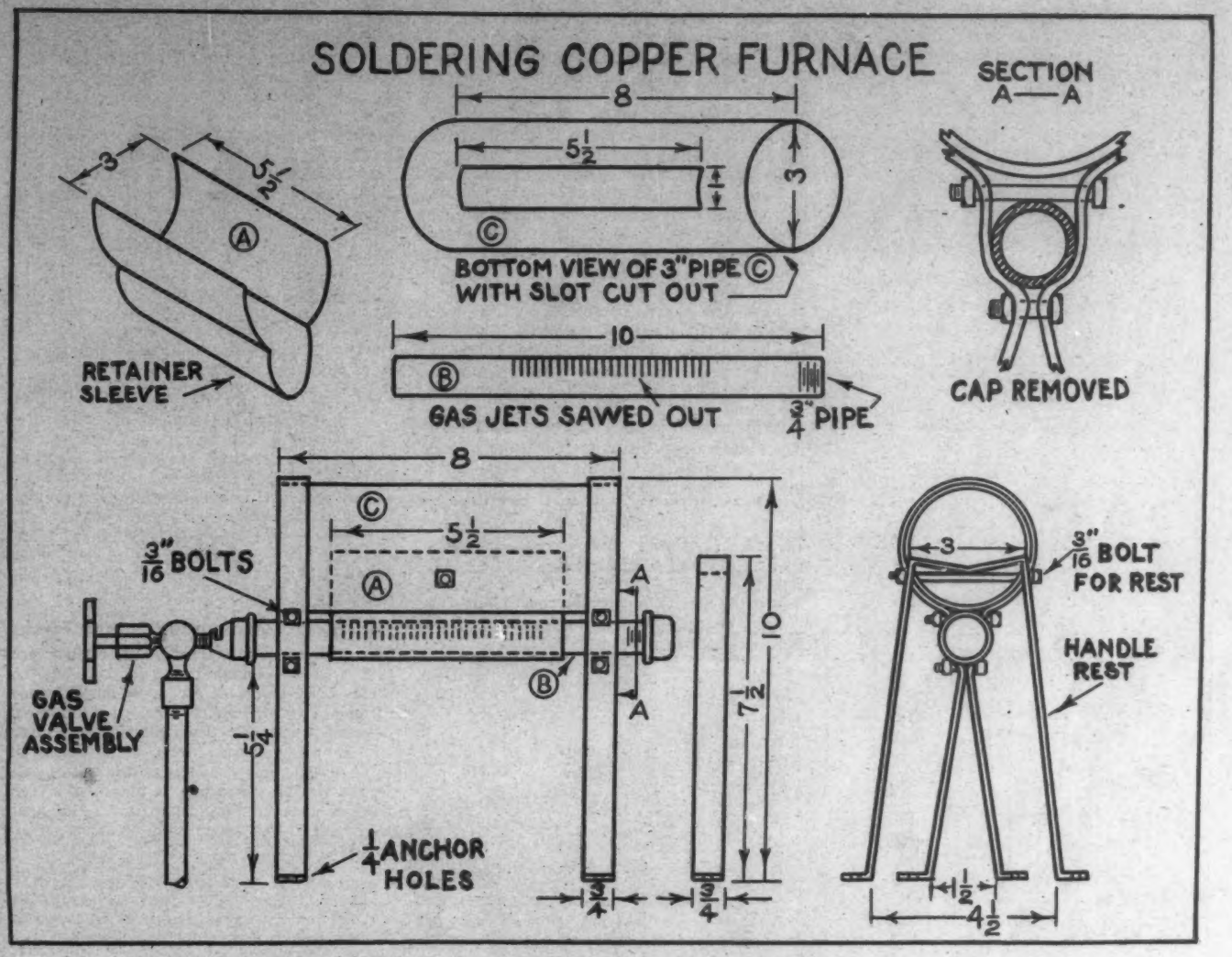


Fig. 1. Details of the soldering copper furnace

ENVELOPE OPENER

ISADORE M. FENN
Chicago Vocational School
Chicago, Ill.

The envelope opener described herewith, is very simple in construction and gives the students experience in soldering. Instructors welcome this project and students enjoy making it. The opener can be made with scrap material. It adds beauty to the desk.

Procedure In Construction:

1. Draw and cut out blade from a piece of brass or any other scrap metal.
2. Turn handle on lathe or carve a suitable handle.
3. Cut a slot in the handle. Insert the blade.
4. Take bare copper wire and wind once around front of handle. Solder joint and then continue winding to desired point. Place a spot of solder on the end of the final turn of the copper wire. (Any type of wire may be used.)
5. Stain and shellac wood part of finished handle. Polish blade with steel wool and then coat with clear lacquer to keep it from tarnishing.

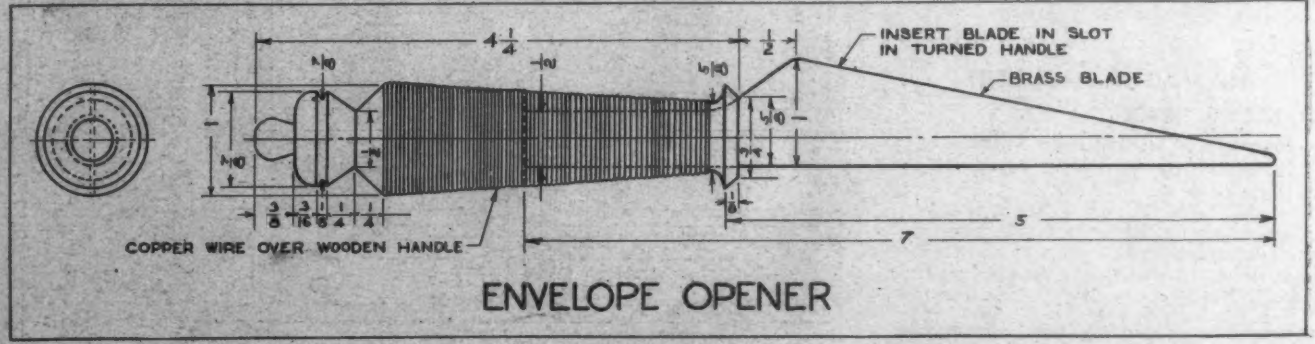
HANDY SEWING KIT

ISADORE M. FENN
Chicago Vocational School
Chicago, Ill.

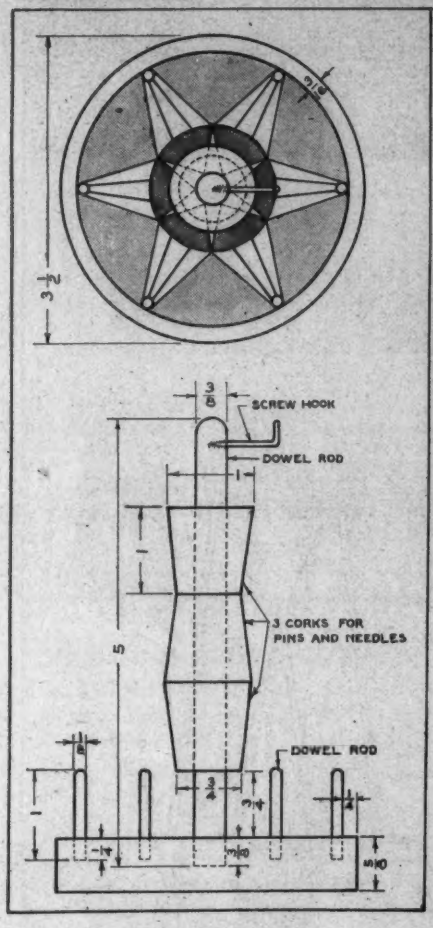
The sewing kit shown and described herewith can be easily constructed. It requires very little material, and students obtain valuable experiences in making it.

Steps in Construction

1. With a compass draw two circles on a piece of wood 5/8 in. thick. The diameter of



one circle should be 3½ in., and the other 3⅛ in. Divide the inner circle into six equal spaces and bore ⅛-in. holes about ¼ in. deep. Bore a ⅜-in. hole ⅜ in. deep in the center of this base.



Handy sewing kit

2. Saw outside the 3½-in. circle and then sandpaper down to the line. Lay out the star design and burn in the lines with a wood-burning set. Then shellac the base.

3. Take ⅛-in. dowel rod and cut six 1-in. pieces. Take ⅜-in. dowel rod and cut one 5-in. piece. Round the tops of these dowels with a file and sandpaper.

4. Take three ¾ by 1 by 1-in. corks and bore ⅜-in. holes through their centers.

5. Assemble all parts with glue according to the illustration. Place screw hook in center dowel.

6. All dowel rods may be stained. Complete sewing kit may be shellacked or lacquered with clear lacquer.

THE MAGNA-FLUX UNIT

STANLEY J. DRAZEK
Formerly at Liberty High School
Now with the Army Air Force
Liberty, N. Y.

The magna flux is used today in industrial and repair shops to detect cracks and breaks in vital iron or steel parts. Since the aim of industrial arts is to portray industry, the principle and operation of magna fluxing is an important addition to the school shop.

The uses of this magna flux unit are practically unlimited. It may be used to detect breaks in vital airplane or automobile parts, in lathe spindles, in shafts, or even check the crankshaft in a water pump that one of the boys may be repairing at home on the farm.

The principle involved is simple. The parts to be tested are placed between the two adjustable poles of an electromagnet. When the direct current of a storage battery is passed through the coil, the core as well as the part being magna fluxed is magnetized. When iron filings are sprinkled over the article being checked, they are attracted and naturally adhere. Then when the current is shut off, the iron filings will drop from the piece, except where a check or a break is present. Here the filings will remain, magnifying the break and making it visible to the naked eye.

Even seventh graders have obtained excellent results using this unit. They were amazed to see a break in a shiny, mirrorlike wrist pin. Since most parts that will be tested are usually hardened steel, some magnetism will be retained even after the d.c. is turned off. In order to destroy this residual magnetism so that the iron filings will drop off, a.c. (alternating current) from a 6-volt transformer has to be sent through the coil. Alternating current changes polarity so rapidly that the residual magnetism is destroyed.

Building the Unit

Any high school student can construct the unit. It may be built by a group of two or three students. It will provide many excellent operations ranging from woodworking, metalworking, and welding to electricity. The entire unit can be built from materials obtainable at any junk yard. Dimensions can be varied to meet the materials available.

The Core

Soft steel or iron shafting will prove most satisfactory for the core, since it becomes magnetized very readily and retains practically no magnetism as soon as the current is off.

To determine the type of steel, a piece can be held against a revolving emery wheel. If it breaks into pitchfork type of sparks it is mild steel. However, if the sparks formed resemble bursting balls of fire, rather near the wheel, it is a higher carbon steel and less desirable for the core.

The shape of the core may be round, square, or hexagon. Methods of making the poles movable can be improvised by the builder. Shaft couplings were used on the unit shown in the illustrations.

If shafting cannot be found, iron pipe and fittings could be substituted. In order to obtain maximum magnetism, the pipe should be filled with soft iron punchings, filings, or short pieces of wire.

Iron Filings

It is surprising the amount of filings discarded daily in the average metal shop. To salvage this a student was assigned the task to run a permanent magnet around the vises and grinder at the end of each shop period. The individual collection seemed insignificant, but after several days enough filings were collected for magna fluxing. It should be remembered that clean and fine filings will provide best results.

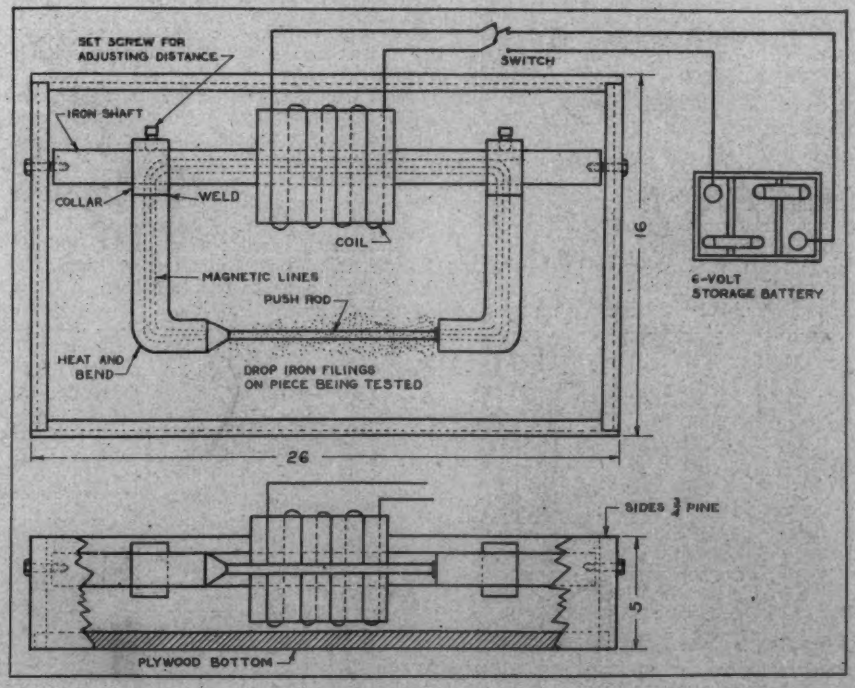
Cleaning and Sorting Filings

The filings used in the unit illustrated were first washed several times in kerosene to remove any traces of grease or oil. Presence of grease or oil would cause the filings to adhere during the demagnetizing operation and the magna fluxing would be unsuccessful.

To obtain only fine filings, the entire collection was passed through a fine mesh screen used in the ceramics department. The finer the filings, the better for detecting small breaks.

The Coil

The coil on this unit was salvaged from an old radio speaker and works very well. If one cannot be found it is a simple matter



Magna-flux unit

Sprinkling iron filings on a wrist pin being tested. Test is being made by two seventh graders

to wind a coil. If no other wire is available, single cotton covered aerial wire, obtainable at most ten-cent stores, can be used.

While winding the coil, students can learn about resistances of wire and coils by applying Ohm's Law.

The Ohm's Law

This law states:

$$\text{Resistance (R)} = \frac{\text{Voltage (E)}}{\text{Amperage (I)}}$$

Since the unit operates on a storage battery, we know that voltage (E) is 6. Using an ammeter, we found that the amperage (I) on the unit illustrated is 1.5 amps. Substituting these values in the formula, we found that the resistance was:

$$\text{Resistance (R)} = \frac{6\ (E)}{1.5\ (I)} \text{ or 4 ohms resistance}$$

Consulting a physics, electrical, or radio book, we found a table containing wire sizes and their relative resistances:

Copper Wire

Size of Wire	*Feet per Ohm of Resistance*
14	396
16	249
18	156.6
20	98.4
22	61.9
24	38.9

Examining the valve for breaks, checks, or cracks

Since our coil should have 4 ohms resistance, and if No. 20 wire is available, multiply 4 ohms times 98.4 ft. per ohm. This will show that 394 ft. of No. 20 wire must be used for the coil winding. If No. 18 wire is on hand, multiply 4 ohms times 156.6 ft. per ohm, which shows that 626.4 ft. of wire are required. From these calculations the student can see that the smaller the wire, the greater the resistance.

A Point of Safety

The unit is free from any electrical shock to the operator. However, the operator should not have a watch or wrist watch during the magna fluxing. It undoubtedly would become magnetized and the movement would become affected. Demagnetizing watches is beyond the scope of this article.

Another view of wrist pin being magna-fluxed. Note the magnetic attraction of the core

WHITTLING-JACKKNIFE TECHNIQUE

W. BEN HUNT
Hales Corners, Wis.

(Continued from page 428 of the December, 1944, issue)

The Cardinal

For whittling the cardinal shown in Figure 163, a piece of wood 2¼ by 5 by 5¾ in. will be required. However, if the wings are not spread, that is, if they are kept close to the body, a piece of wood 1½ in. thick will do. Since this project is to be painted, two pieces of wood can be glued together to get the thickness required. In fact, it may be a lot better to glue two good pieces of wood together than to try to whittle it from one solid piece. The bird shown in Figure 163 was whittled from a solid piece of pine which chanced to have a knot in it. This meant that there was plenty of cutting against troublesome grain.

Fig. 163. The cardinal

In whittling birds, one is often confronted with the problem of what is to be done with the legs. In this case it was overcome by having the bird rest on a sort of rough pedestal and even when viewing the right side, one can see the right foot projecting from under the bird's body. See Figure 164. The grain, instead of running up and down, follows the beak and also follows the tail feathers to some extent. So there is practically no short grain to break off. See Figure 165.

Instead of V cuts to show feathers, a straight cut is made first and a long slant cut is made to meet it as shown in the small sketch below the bird's head in Figure 165. The actual length of a cardinal is 8¾ in.,

Fig. 166. Rear view of the cardinal

if anyone wishes to make the bird that size.

For the coloring it is best to refer to some book on birds, but a satisfactory effect can be obtained by coloring the entire bird a bright red, the beak a light orange, the legs a yellowish brown and a solid black area as shown in the illustrations. The stump or pedestal may be given a grayish green to offset the bird.

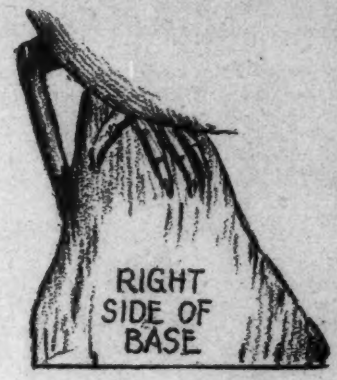


Fig. 164. Arrangement of the legs

Fig. 167. Ready for the paint

A CORRELATION PROJECT

JAMES E. REAGAN

John Adams High School
Cleveland, Ohio

A Christmas toy correlated project carried through some years ago proved very interesting to the students of several departments of our school.

The toys chosen to be made were the ever popular lead soldiers, Indians, cowboys, and buffaloes. After a conference, it was decided that the departments that could best correlate to do this work were the metal shop, the art department, and the print shop.

The work started in the metal shop where all the boys were divided into groups. Each group had certain operations to perform. The first group poured the molten metal in the molds. When these were taken out another group trimmed the rough edges. The cast figures were then passed to another group who filed the flat surfaces and handed them to the final group for inspection.

Then the toys were ready for the art classes. Here also, the factory production methods were used. The toys were placed on boards and each student was given a specific part to decorate. The boards were passed from left to right as each pupil painted

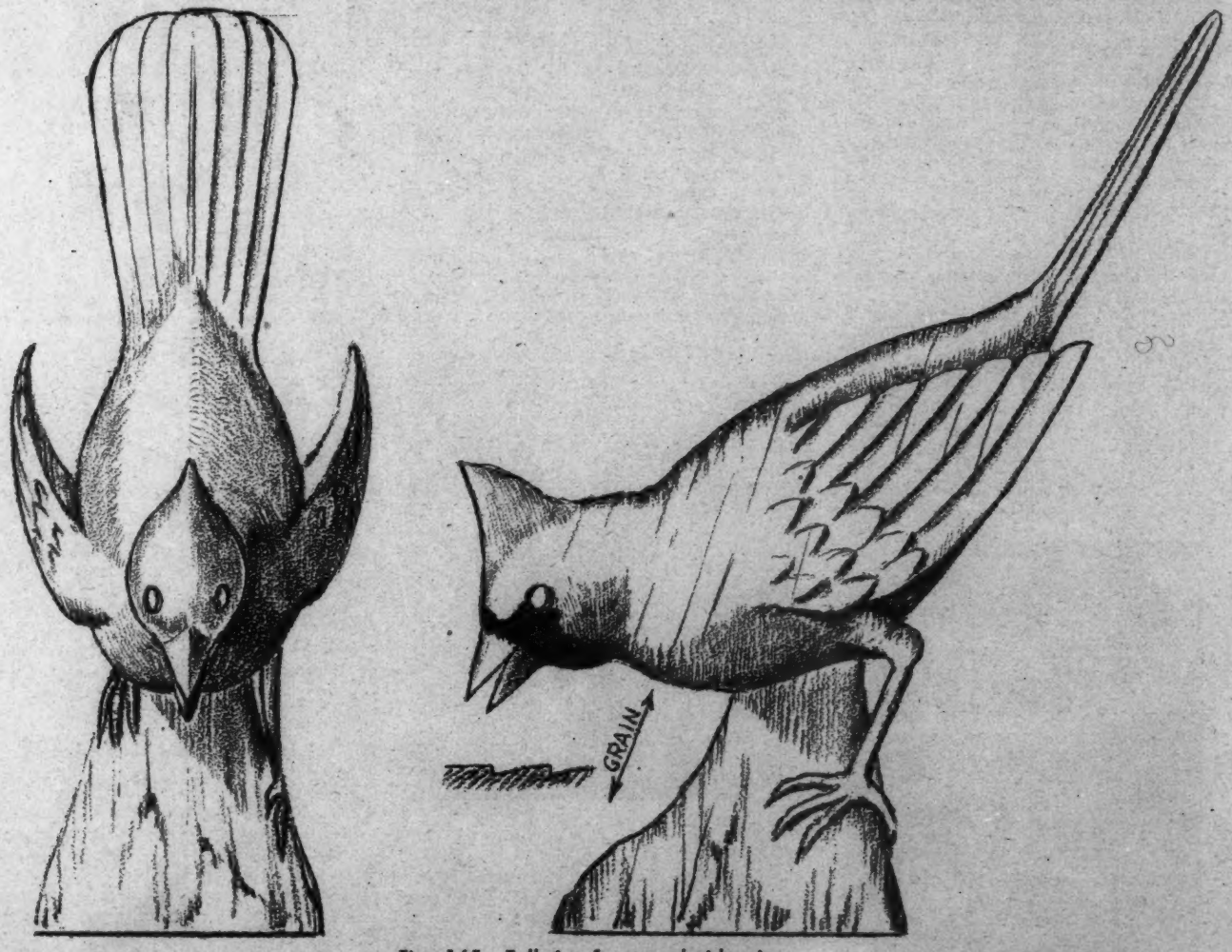


Fig. 165. Full-size front and side view

the part assigned to him. One would paint just the hats, another the guns, still another the shoes, and so on until the figure was completed. A quick-drying enamel was used to prevent colors from running together.

While this group was decorating the figures, other pupils were working on designs to be used as a background on which to fasten the toys. Three of the best designs were selected and turned over to other pupils, who cut linoleum block cuts from them. The three chosen were a Christmas tree, a head of Santa Claus, and a modernistic forest scene.

These were sent to the print shop where they were printed. The cards were then sent to the metal shop where the boys made jigs to drill holes into them for mounting the toys.

The art classes completed the work by sewing the decorated toys on the cards. About five hundred cards, each holding six of the little lead figures, were made to be distributed to needy children.

The finished product was very attractive, and the teachers felt that their pupils gained not only in working experience but in the spirit of altruism, knowing they were doing something to bring cheer and happiness to others.

THE FUNDAMENTALS IN JUDGING A HOUSE

J. EDGAR RAY
The Stout Institute
Menomonie, Wis.

(Continued from page 432 of the December, 1944, issue)

Chimneys

Chimneys can be very interesting or they can be just the ordinary smokestacks that are a familiar sight on so many of the small homes that can never have that appearance so much desired in a home. In England and many of the European countries, they make so much of the chimneys that each home seems to have an individuality all its own. It takes so little planning for the detail of the chimney to make it outstanding, and picturesque, that it is worth the time and effort to put a little study on this piece of masonry.

Chimneys can be built of many designs, and a combination of stone, brick, stucco, and tile will add just that necessary touch to put it in a class of its own. The thickness of the chimney is optional but it should have enough size to give the feeling of stability and not look as though it were built from the angle of economy in material and labor. It should be planned along with the elevations and made to look as though it was really a part of the house. Ornamental crocks or chimney pots add a finished appearance to the chimney and if it is necessary to leave the flue lining extend above to take care of this feature, they should be staggered, one above the other, with a suitable projection to the chimney cap. All projections should be carefully thought out and built with some kind of a drip or a drip groove in the stone or concrete cap to keep the soot and black drippings from coming down the chimney in rain and snow.

In a frame house where the chimney is built up the side of the house on the outside, it will appear to divide the house on that elevation into two parts, unless the chimney is painted to match the house. There is no rule to designate just where the chimney should be placed, but the fireplace has much to do with its location. Here are some elementary rules in the designing and building of a chimney.

Fig. 10

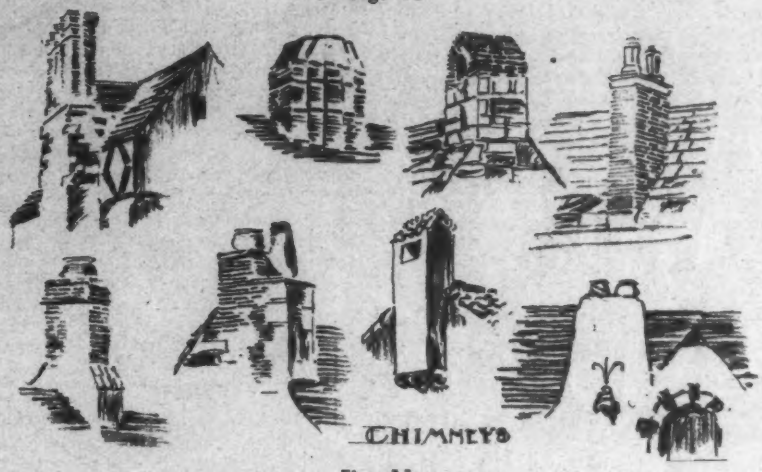


Fig. 11

It should be made as fireproof as possible, and insulated against any chance of a fire by having all frame work built at least 2 in. away from the brickwork. The chimney should be built at least three feet above the highest point of the roof. Figures 10 and 11 show sketches of some possibilities in chimneys, giving the general shape and variations that may be worked into chimney design. "Each man's chimney is his Golden Milestone," Longfellow.

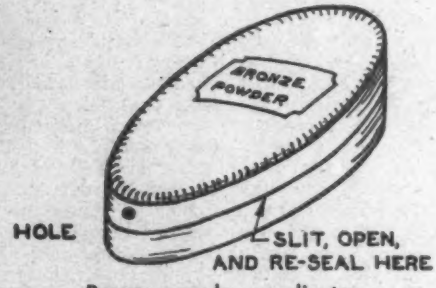
(To be continued)

BRONZE-POWDER APPLICATOR

L. GAYLERD LINDAHL
State Teachers College
Chadron, Neb.

Every shop teacher and home craftsman is familiar with and finds use for the various colors of bronze powders. Lacking the more expensive devices for applying these powders for decorative effects, he resorts to the time honored system of placing a small amount of the powder in a folded piece of paper and blowing it onto the wet surface of the project. The writer has used the following method with much success:

1. Secure from any grocery or drug store a box of insect power in a pasteboard bellows box. (El Vampiro, 10c)
2. Carefully slit the box around the center of the side at the parting line with a sharp knife or razor blade. Remove the plug from the opening as you cut to it.
3. Lift the cover from the box and remove the insect powder. Carefully brush out all traces of the powder.



Bronze-powder applicator

4. Fill the box with the desired color of bronze power and replace the cover.
5. Seal over the parting line all the way around the box with scotch or gummed paper tape. If the tape is not the correct width it should be precut or trimmed to a width the thickness of the box.
6. Replace the plug by pushing it through the tape into the original hole.
7. Neatly type or letter the color of the powder on a gummed paper label and place it on the box.

8. Make up as many of these bellows boxes as you have colors of powder.

To use:

1. Remove plug from hole.
2. Hold the box in the hand so the hole is uppermost and the box points slightly up from the horizontal.
3. Point the box toward the surface on which the powder is to be applied and gently work the thumb up and down on the center of the box. This gives a bellows effect and distributes the powder just where it is desired.

Precautions:

1. Apply the bronze powder at the time the base coat of varnish, paint, enamel, or other finish is just becoming tacky.
2. Redistribute the powder in the box now and then by holding the finger over the opening and giving the box a gentle shake.
3. Practice and study the effects you can get through spotting, shading, etc., by holding the box at different distances from the object, using different pressures and speeds of pressing on the box and by holding the box at various angles.

Advantages:

The method is cheap because it is less wasteful of powder. It provides a good way of keeping the powders convenient for use, and furnishes a good technique for obtaining interesting effects.

I AM A COLD CHISEL

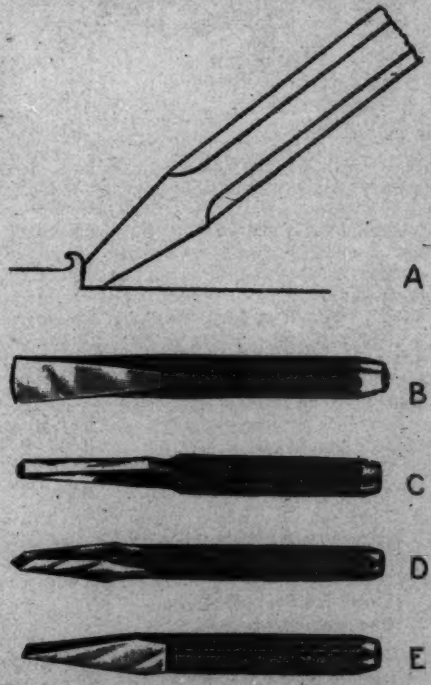
IRMA BULL
Defense Worker
Milwaukee, Wis.

I am a chisel. I was born in a steel plant and shaped and formed as are most chisels. When I was new, I often wondered just what I was, but one day I found out. Harry, he was the first workman I knew, was breaking in a new man at our shop. He, the new man, was rather inexperienced; he knew nothing whatsoever about tools. In fact, he picked me up and said to Harry: "Say, Mr. Field, what sort of an animal is this?"

Well, Harry sort of broke out in a smile and soon explained: "That 'animal,' as you call it, is a chisel and it's a quite useful little tool too." (At this point in the conversation my ears pricked up considerably.) "Yes, very useful," he continued, "you see it has this little cutting edge" (he pointed out the sharpened edge of my blade) "and it is driven into the stock with a hammer. It works like this." Then Harry picked me up, dusted me off, and made me perform my special tactics before the new man. He showed him how I was used in cutting, dressing, and shaping. When the new man first tried to do some hand chipping (which Harry explained to him was the process of removing stock with a hammer and chisel), he grasped the hammer tightly near the head and started to tap me gently. Then Harry stopped him: "Look, Frank," he said, "don't be afraid of that tiny chisel. It's a strong little 'animal.' (I raised my ears again.) Hold the hammer down lower on the handle and get the full advantage of a full swing. Hit the head of the chisel hard." Thus the new man, Frank, went to work. And work he did. During the workouts and conversations between Frank and Harry, I discovered just what I was made of, a good grade (Ahem, Ahem!) of octagon-shaped steel, sometimes known as chisel steel. I was made just like other chisels, Harry said. First I was forged, then annealed, later hardened, and finally tempered. The annealing process made me stronger; that's why I could be hit so hard. The hardening made my cutting edge nice and firm. One day when Frank put me in the wrong drawer, next to some strange objects, Harry rescued me and explained: "See here, Frank, a chisel is classified according to the size of its cross section. The length has nothing to do with it." Then he carried me to my drawer and showed him the difference between one of the "strange drawer" chisels and myself. After that, I was always placed in my own familiar resting spot. Frank had learned.

Yes, both Frank and I learned much. When Harry scolded Frank for doing something wrong, I always learned new things. For instance, the day that Frank first sharpened a cold chisel, Harry taught us both much. The new man started out by holding the chisel at the wrong angle. Harry rushed over and explained: "Say, Frank, I know that a chisel usually requires an angle of seventy degrees, but in this case that's all wrong. The angle always depends upon the strength of the stock that's going to be chiseled." So I watched him start out again. This time he pressed the chisel against the wheel too hard and Harry had to say: "Watch out that you don't push too hard, Frank. It will draw the temper off." In spite of all this criticism, Frank continued, and by the end of the day my head was aching with all that I had learned. Besides being taught all this about grinding, Frank also had to find out about the uses for all the various tools. He used to walk around the shop and I'd hear him muttering under his breath: "A round nose chisel is used for chipping filleted corners and concave surfaces; a flat cold chisel is the best chisel for flat surfaces or for cutting through thin metal; the cape chisel is a narrow chisel for — for — (this seemed to be the hard one for him) — for grooves and slots; the round cape chisel is the one used in drill press work and last but not least, the diamond point chisel is used in making V-shaped grooves." By the time Frank had learned these I knew them practically backwards and forwards.

But, in spite of the fact that he was slow, Frank learned a lot. He discovered that a chipping guard should be placed in front of the work to protect others against flying pieces while I was doing my job for him and he found that goggles are really a necessity to keep his eyes from being injured. He discovered things about the vise. Harry taught him that he should always use a packing block when he does chipping in the vise. He told him that he should never hammer the handle of the vise and that he should use guards on the vise jaws to protect the finish of the work. Practice taught him to watch the cutting edge instead of my head and several times I got some hard knocks when I fell to the floor while he was trying to gain the ability to hit my head without looking at it. One of the latest things he learned about was "mushroom heads." One day we — that is Frank and I — were working together when Harry began to walk by. I say "began to walk by" because suddenly he stopped and rushed back, saying, "Look, Frank, I meant to explain about this (and he took a hold of my head); it is what we call a 'mushroom head' and it's very dangerous." (Imagine calling me dangerous.) "This type of head is caused by too much pounding and in a few more strokes some of these overhanging pieces may fly off and injure someone. Come over to the grinder and I'll show you how to make it safe again." Well, now since I am Frank's favorite tool, he not only watches that I have a sharp cutting edge, but he is careful also that I don't get a "mushroom head." From Frank and Harry I have learned that a chisel can live quite a useful and happy life.



At **A** is shown a cold chisel with a cutting angle of 70 deg. Softer metals should have an angle of less than 70 deg.
At **B** is a cold chisel with cutting edge slightly rounded to give better cutting action
At **C** is illustrated a round-nose chisel
At **D** is a diamond point, and at **E** a cape chisel

ORNAMENTAL TIN CRAFT

CHRIS H. GRONEMAN
Industrial Education Department
A. & M. College of Texas
College Station, Tex.

(Continued from page 423 of the December, 1944, issue)

Desk Blotter

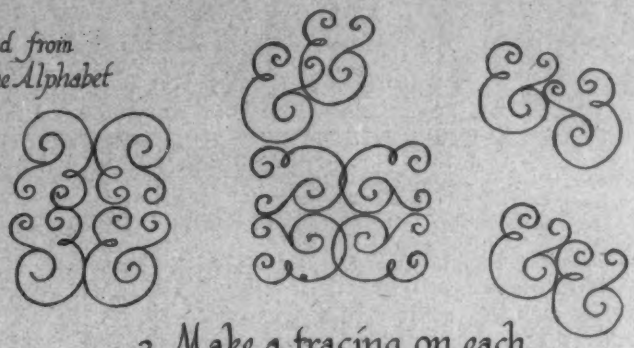
The desk blotter is an individual item which is very essential to the correspondent. It saves the large blotter from being used and appearing soiled. Any small blotter can be cut to fit this holder in a few moments. This blotter should be cut the same size as the layout of *C*, upper right in the drawing. The material for this project should be of single thickness sheet tin stock, which is durable enough for the use of the blotter. After the top layout has been cut and bent, the corners should be soldered. Layout *C* in single thickness gives ample spring to hold the blotter in place securely.

Surface decoration may be altered to suit the choice of the craftsman and the general theme of the entire desk set.

(Continued on page 32)

HOW IS A REPEAT PATTERN DEVELOPED?

Ampersand from Goudy, The Alphabet



1. Draw one unit of the repeat.

2. Make a tracing on each of several sheets of tracing paper.

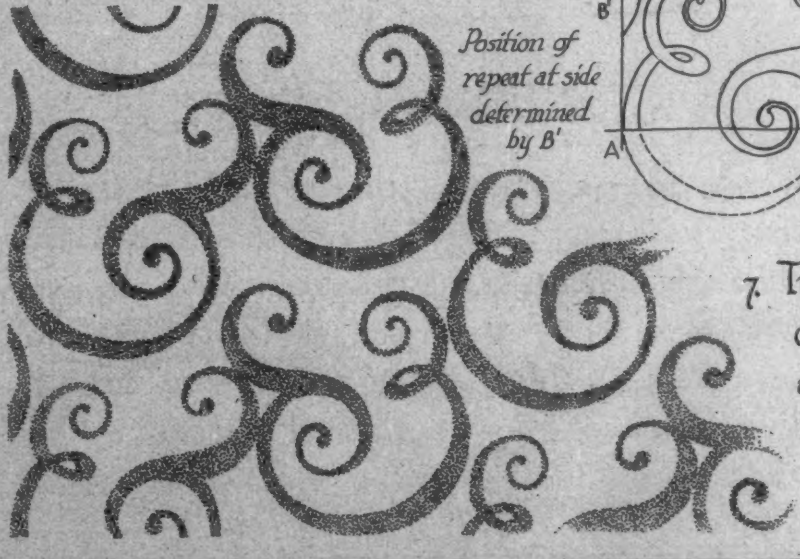
3. Move these about until a desirable space-filling arrangement is achieved.

Original unit with repeat in reverse

4. Draw a boundary line to form a practical block, or stencil. This boundary should cut off projecting parts.

5. If possible, divide at some point or line of natural separation.

6. It may be necessary to move a portion from one side to another to indicate moving of the pattern. *(see B)*



Position of repeat at side determined by B'

Pattern fitted within a Rectangle

7. Transfer the portions cut off by the boundaries to the opposite side of the pattern.

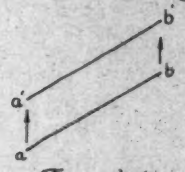
Printed Pattern

Plate 48. Design course by Burl N. Osburn, director of industrial arts, State Teachers College, Millersville, Pa.

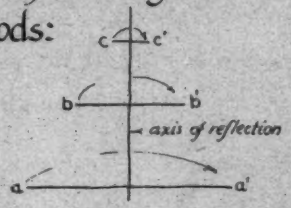
IS THERE A GEOMETRY OF REPEATING ORNAMENT?

Polya, Speiser, Bradley,* and others, have developed a special field of geometry based on the problem of fitting together polygons to cover a plane surface so they fill the space without gaps, and without overlapping.

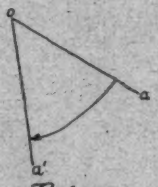
The most common type of repeating design is that based on the division of the plane into congruent parallelograms. The single figure multiplies principally by three methods:



Translation



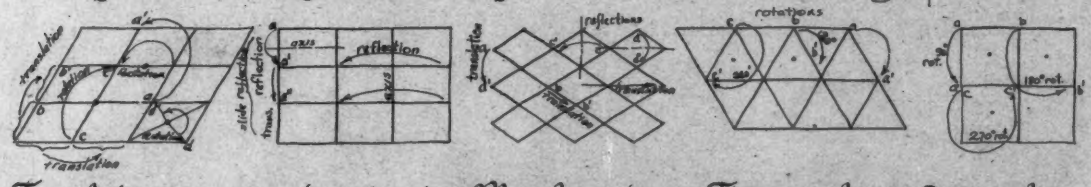
Reflection



Rotation

"*Translation* means a motion of the plane in itself a given distance in a given direction.... *Reflection* means a rotation of 180° of the plane in space about a fixed line, called the axis of reflection.... *Rotation* means a turning of the plane in itself about some point through a given angle."*

Bradley describes five types of parallelogram assemblages, formed by the general parallelogram, the rectangle, the rhombus, the special rhombus formed from two equilateral triangles, and the square. Each has its own set of motions.



Translations may be made in two directions, parallel to the sides. Rotations of 180° are made on the center of a side, the vertices, or the intersection of diagonals. Rectangles add to these a set of reflections, whose axes are sides of rectangles.

Rhombuses have about the same properties as rectangles.

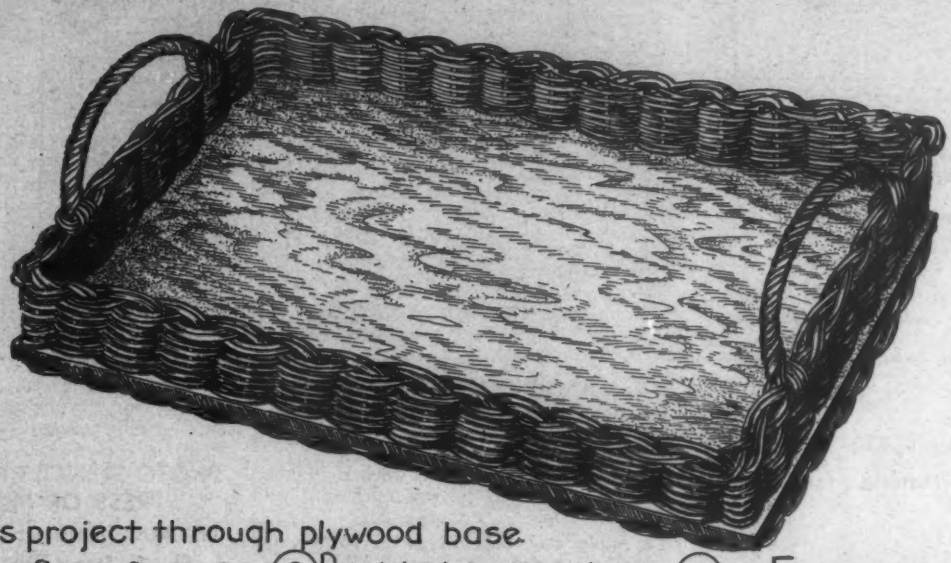
The special rhombus has the slide reflections of general rhombus plus rotations of 120° and 240° about centers of triangles.

Squares have motions of rectangles plus rotation of 90°, 180°, and 270°.

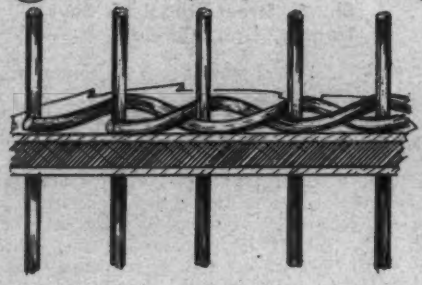
* Bradley, A. Day. *The Geometry of Repeating Design.* Bureau of Publications, Teachers College, Columbia University, New York City, 1933. vi + 131 p.

Plate 49. Continuation of design course by Burl N. Osburn, director of industrial arts, State Teachers College, Millersville, Pa.

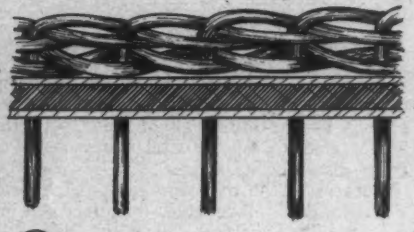
A SANDWICH TRAY



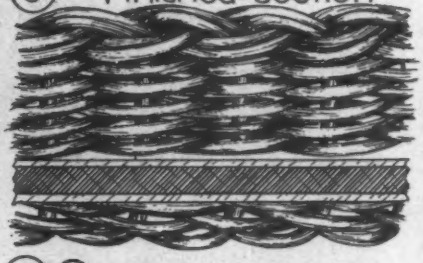
(1) Spokes project through plywood base.



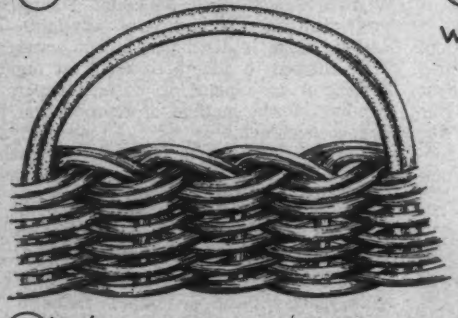
(2) Braided border base



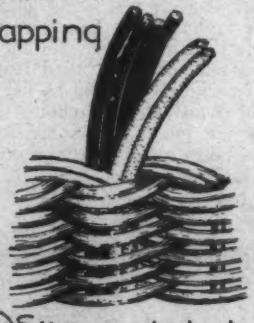
(3) Finished section



(4) Handle cores inserted



(5) Reeds inserted for wrapping



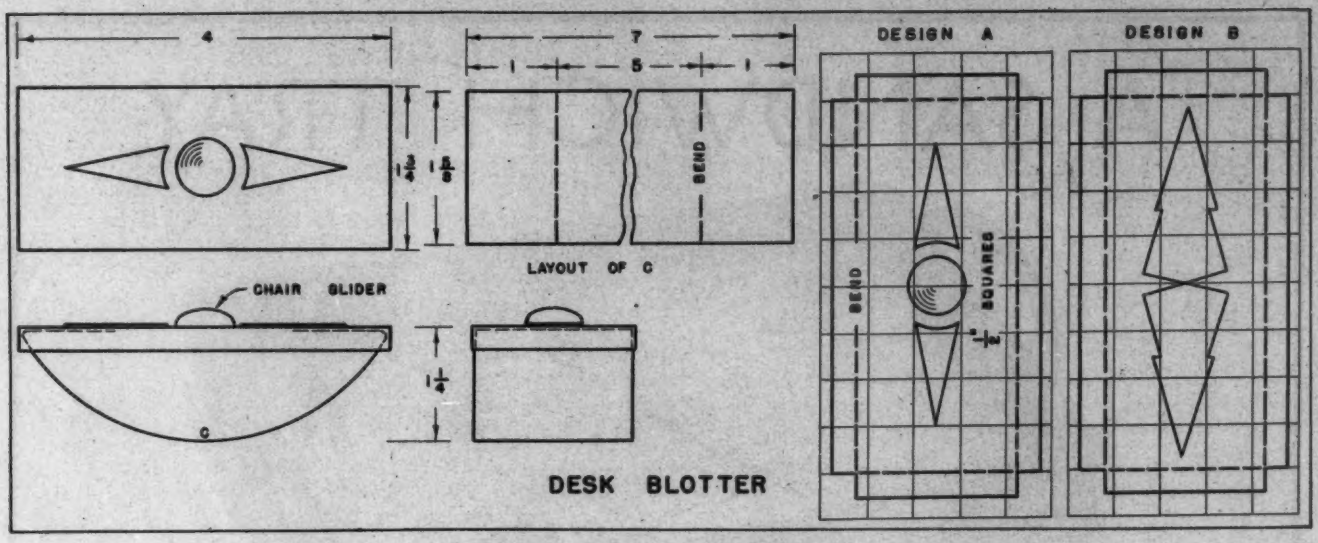
(6) Core wrapped once

(7) Wrapping completed

(8) Slip ends below braid. Finish with a half hitch.

(9) Reeds drawn taut for finished knot

Sandwich tray submitted by Louis V. Newkirk, director of industrial arts, Chicago, Ill.

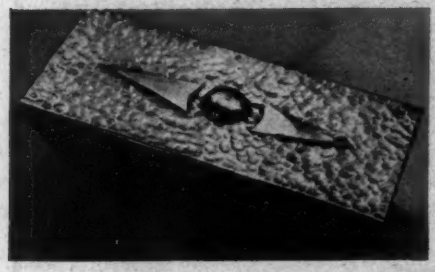


Details and designs for desk blotter

(Continued from page 28)

Bill of Materials for Design A

No. of pieces	*Item*	*Size*
1	Sheet tin	2½ x 5
2	Sheet tin	½ x 1¼
1	Sheet tin	1⅝ x 7
1	Chair glider	½ to ¾
1	Blotter	1⅝ x 7
	Solder, flux, steel wool	



Desk blotter

Tools

Alcohol burner, copperplating setup, emery cloth, file, heating device, lead or wood block, peening hammer, pencil, rule, scriber, soldering copper, tin snips.

Procedure

1. Lay out design as shown in illustration, or develop original design.
2. Cut out tin stock for blotter top.
3. File and dress edges with emery cloth.
4. Peen surfaces on lead or wood block.
5. Band edges of top as shown in illustrations.
6. Solder corners.
7. Remove prongs from chair glider, file edges.
8. Sweat-solder glider in place with alcohol torch.
9. Cut and sweat-solder ornamental pieces in place.
10. Lay out, cut, and form blotter support *C*.
11. Rub parts which are to be plated with steel wool.
12. Apply thick plating of copper.
13. Polish project with steel wool. Hold metal with a cloth to prevent touching it with your hands.
14. Apply coat of clear metal lacquer and allow to dry.

A GOOD SALVAGING JOB

Industrial concerns could take a tip from the classroom and workshops in our public schools by the utilization of wood with the use of glue, to salvage vital material that is being discarded as scrap.

Because of the thin glue line possible with Franklin liquid hide glue, manufactured by the Franklin Glue Co., Columbus, Ohio, it is being used in industrial-arts classes to make use of scrap wood as well as for all types of work where a fine quality glue is required.

The student on the left, in the illustration, has made a solid piece of board from three pieces of a packing case such as the student on the right is salvaging. Franklin's thin glue line makes the joints almost invisible. The picture was taken under actual working conditions at the Boys' Trade School in Columbus, Ohio.

A good salvaging job

PHOTO STENCILS FOR SILK SCREEN PRESS OR MIMEOGRAPH

W. BRUCE ADAMS
Church Street School for Boys
Toronto, Ont., Canada

Photo stencils made by the carbon process may be used for silk screen printing or on duplicating machines. To the beginner they offer some advantages over other methods of making photographic stencils, partly because of the fact that errors in exposure become evident before the design is transferred to the screen, and partly because they permit the use of inexpensive screening material. The equipment needed is simple, and the process itself presents no difficulties. A darkroom is unnecessary, and the only chemical required is some pure potassium bichromate, preferably in the form of crystals. The carbon tissue is developed in hot water and then allowed to adhere to a silk or organdy screen, or to a piece of Yoshino paper, depending on the method of reproduction that has been chosen.

Carbon tissue, or pigment paper, specially prepared for the silk screen process is available, and must be sensitized before use. The sensitizing solution is made by dissolving a half ounce of potassium bichromate in twenty ounces of warm water. After cooling to 60 degrees F., this is poured into an enameled tray, and a piece of carbon tissue is slid under the surface. See Figure 1. Air bells are removed as they form, and the carbon tissue is turned over once or twice during

Fig. 1. The carbon tissue is sensitized in a solution of potassium bichromate

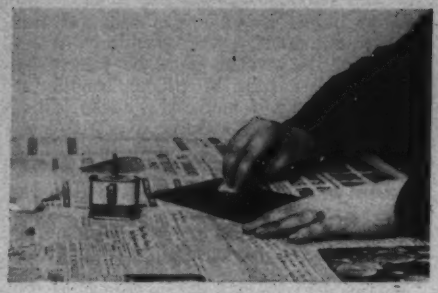


Fig. 2. A ferrotype tin is prepared for each stencil by oiling and polishing

its two-minute immersion. This process may be carried on in bright light. The sensitizing solution will keep for a reasonable time if stored in brown bottles in a cool place.

The piece of carbon tissue is squeegeed to a ferrotype tin which has previously been prepared by rubbing a drop of light sewing-machine oil over its surface with a piece of absorbent cotton. See Figures 2 and 3. The tin is then polished thoroughly with a clean piece of the same material, and as much of the oil as possible removed. Drying should be done in a cupboard or other dark place. The tissue is sensitive to light after drying, and should be kept in a box until used.

Fig. 3. The sensitized tissue is squeegeed into perfect contact with the ferrotype tin, and dried in a cupboard

The stencil is made from a positive copy, which may be a drawing on tracing paper done with India ink, a photographic positive on film, or a photographic positive on thin paper which has been soaked in oil to render it more translucent. The beginner would be well advised to experiment with a design on tracing paper, but care must be taken to select a good grade of undiluted ink which will give absolute opacity.

A regular photographic printing frame may be used to hold the positive and the sheet

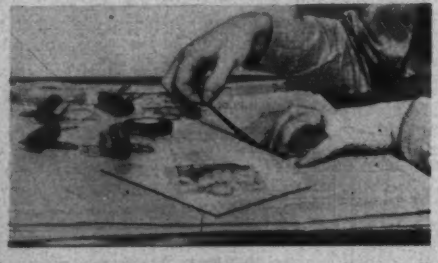


Fig. 4. A printing frame may be made from two sheets of glass, some lantern slide tape, and four spring clips

of sensitized pigment paper, but if this is not available, two sheets of glass and some spring clips will serve. See Figure 4. A safe edge should be provided so that the edges of the pigment paper will not be exposed to light. The drawn side of the positive is placed in contact with the sensitized surface of the carbon tissue, and the sheets of glass are then clamped tightly together.

Fig. 5. The design is transferred to the carbon tissue by exposure to the light of a photoflood lamp

Exposure is made to the light of a Number 2 Photoflood lamp in a reflector. Provision should be made so that the lamp may be kept at a definite distance from the frame. See Figure 5. This distance will depend on the size of the stencils to be made, and should be slightly greater than the diagonal of the largest one likely to be needed. Correct exposure is a matter of individual experiment, since there are so many variable factors, but as a rough guide it may be stated that with the lamp 9 in. away from a drawing on white

Fig. 6. A piece of temporary support paper is oiled and polished, then soaked in cold water until limp

tracing paper, an exposure of four minutes was found satisfactory.

Sheets of lightweight transfer paper are needed. These are manufactured by the makers of the carbon tissue, and must be oiled and polished in the same manner as the ferrotype tin was previously prepared. See Figure 6. It will also be advisable to mark the back of the paper so that it can be distinguished when wet. A sheet of the prepared transfer paper is soaked in cold water until it is limp. The exposed carbon tissue is taken from the frame and soaked in cold water, as shown in Figure 7. It will curl up, then begin to uncurl, and at this point should be removed from the water, placed face to face with the

Fig. 7. After exposure, the carbon tissue is also soaked in cold water until it is nearly limp

prepared sheet of transfer paper, and the two squeegeed firmly into contact on a piece of glass. See Figure 8. The two adhering papers are placed between blotting boards, put under pressure, and left for ten or fifteen minutes. This may be done as shown in Figure 9.

At the expiration of this time, they are put into a deep dish of warm water, the carbon tissue uppermost. After about a min-

Fig. 8. The carbon tissue is then squeegeed face to face with the temporary support, which has been laid out on a sheet of glass

ute, the black pigment will commence to ooze out around the edges of the carbon tissue. See Figure 10. When this occurs, one corner of the backing paper of the piece of carbon tissue is lifted with the fingernail, and the backing paper is then carefully

Fig. 9. The carbon tissue and the temporary support are left for fifteen minutes between blotting boards under pressure

stripped off under water and thrown away. This will leave the carbon pigment adhering to the temporary support, or transfer paper, but the design may not be very plain as yet.

The temperature of the water is now increased until it is as hot as the hand can bear.

Fig. 10. They are then put in hot water until the pigment is seen oozing out from around the edges. The backing paper of the carbon tissue is then stripped off

One hand is used to support the paper and pigment, while the other hand splashes the hot water gently over the surface of the pigment. See Figure 11. If the exposure has been correct, the parts which were exposed to light will remain a solid black, while the unexposed parts will gradually wash away until they appear a clear white. Development

Fig. 11. The unexposed pigment is washed away by gently splashing hot water over the surface

must be done thoroughly, and it will be advisable to finish in a dish of clean hot water.

The transfer paper and its adhering pigment are chilled for a minute or two in cold water, and then placed on a piece of glass with the design uppermost. If the stencil is for use on a silk screen press, the stretched screen is lowered carefully over the pigment, and squeegeed lightly until there is perfect contact between the carbon pigment and the screen. See Figure 12. A piece of waxed paper is placed beneath the transfer paper so that the drying will be faster from the screen side.

Fig. 12. The screen is lowered over the carbon tissue which adheres to the temporary support, and the two are gently squeegeed into contact

When the drying is complete, the transfer paper may be stripped from the carbon pigment, which will remain tightly fastened to the screen. See Figure 13. The unused portions of the screen are then masked off in the usual manner, and printing is done in the same way as when a paper stencil is used.

If the stencil is to be used on a duplicating machine, a piece of Yoshino paper, obtainable from a dealer in Japanese papers, should

Fig. 13. When dry, the temporary support is stripped off

be squeegeed to the carbon pigment after the chilling operation referred to above. The transfer paper is stripped off when dry, and the stencil is ready to be put on the machine. This can most easily be done by cutting an opening in a regular stencil sheet slightly smaller than the photographic stencil, and fastening the latter in place with adhesive tape. By this method it will be a simple matter to combine typed material with illustrations.

THE VACUUM GAUGE

EDWARD V. WALTERS

Wilbur Wright Vocational School
Detroit, Mich.

Lecture and Demonstration Lesson

Preparation: The vacuum gauge is an important instrument that can be put to good use by the transportation mechanic in two ways: (1) to determine faulty conditions and diagnosis; (2) to determine after servicing if faulty conditions have been remedied and high class performance restored.

Before using the vacuum gauge one should have a good idea of the meaning of vacuum, the units of measurement, things that affect engine manifold vacuum, the operation and construction of the vacuum gauge, and how to use it.

There is a similarity in the principle of operation of the vacuum gauge and the barometer studied in the science class and used by the weather man to forecast the weather.

Presentation: By vacuum is meant, according to the dictionary, "space entirely devoid of matter." A vacuum might be created by taking a glass tube of proper length (at least 31 in. long if mercury is used), fill it with mercury, place a finger over the open end, turn glass tube upside down so end held closed with finger can be immersed below the level of mercury in a dish and then remove finger holding mercury in tube. When finger is removed from the end of glass tube some of the mercury will leave the tube; this space in the tube above the mercury is devoid

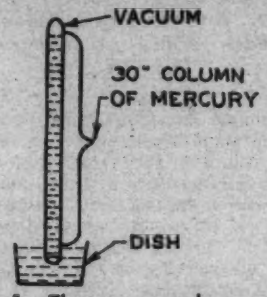


Fig. 1. The mercury barometer

of matter and can, therefore, be considered a vacuum at zero pressure. The mercury in the glass tube will remain at a height of about 30 in. as shown in Figure 1. The mercury in the glass tube remains at a height of 30 in. at sea level because of the pressure of the atmosphere on the mercury in the dish. Since there is a vacuum (zero pressure) on the mercury near the closed end of the tube and about 15 lb. air pressure of the atmosphere supporting the column of mercury (air has weight and at sea level the pressure is about 15 psi., i.e., 15 lb. per sq. in.), the 30-in. column of mercury is held by 15 psi. Therefore, each inch of mercury is held by a ½-lb. pressure since 30 divided by 15 is equal to ½ or .5.

Because of the information contained in the foregoing, it is possible to construct a vacuum gauge by taking a glass tube open at both ends and immerse one end in a dish of mercury. If a vacuum pump or some device (see Fig. 2) for withdrawing air from above the mercury was connected to the upper end of the tube, the following results would be obtained. If atmospheric pressure was present in the tube above the mercury, the mercury would not rise in the tube as the pressure would balance the atmospheric on the mercury in the dish.

If the vacuum pump was operated to withdraw 1 lb. of air pressure from above the mercury in the glass tube as shown in the illustration, there would be 14 lb. pressure on top of the mercury in the glass tube and 15 lb. atmospheric pressure on the mercury in the dish; or the difference which is 1 lb. of pressure to support the mercury in the glass tube. Since 1 lb. psi. will support a column of mercury 2 in. in height, it might be said that the vacuum in the tube above the mercury was equal to 2 in. of mercury

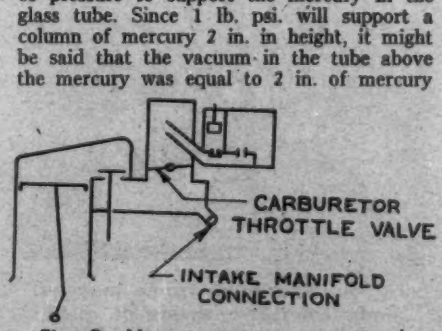


Fig. 3. Vacuum gauge connected to automobile engine

or the pressure above the mercury was 1 lb. lower than atmospheric. Likewise, if the vacuum pump was continued in operation to lower the pressure or increase the vacuum in the tube above the mercury, results would be obtained as follows:

Pressure (in lb.) difference in tube from atmospheric pressure:	*Height of mercury column or vacuum in inches:*
1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16
9	18
10	20
11	22
12	24
13	26
14	28
15	30
(zero pressure in tube)	(perfect vacuum)

Application: Similar methods can be used for testing if a glass tube is immersed in a dish of mercury and a rubber hose used to make a connection with the upper end of glass tube to the intake manifold on engine to be tested (engine being used to create vacuum in manifold when piston goes down in cylinder and intake valve opens, instead of vacuum pump). If the engine was running at an efficient idle speed so that the pressure difference in the intake manifold and tube is 10 lb. lower than atmospheric pressure, the vacuum gauge would show a reading of 20 in. of mercury.

Engine speed has an effect on engine vacuum. Increased throttle opening above specified idle r.p.m. will permit too much fuel to enter the manifold. This will lower the vacuum. Throttle not cracked open a sufficient amount for efficient idling will not give sufficient fuel to produce proper speed to obtain the highest vacuum. Fuel too rich or too lean, or improper timing of ignition, will prevent obtaining most efficient idling speed to obtain highest vacuum. A tachometer and exhaust gas analyzer or vacuum gauge should be used as indicating gauges signifying that the throttle-location adjusting screw and mixture adjusting screw have been turned to proper positions. Always remember the original positions of the screw driver slots on adjusting screws so that if an improvement is not noticed on the gauges when adjusting screw has been turned both in the clockwise and counterclockwise direction, it can be brought back to its original position. Before making any adjustments the engine temperature gauge should read at normal operating temperature, or the engine should be run until the temperature gauge shows the proper temperature.

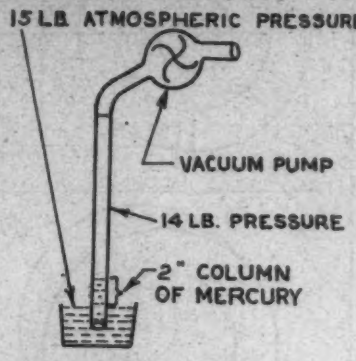


Fig. 2. Vacuum pump

The important point to consider in using the vacuum gauge is the action of the gauge rather than the actual amount of vacuum. The same engine may not give the same vacuum reading from day to day even though in same mechanical condition because of the change in atmospheric conditions. Also, all engines do not give the same high vacuum reading because of the difference in the number of cylinders, smoothness in running for producing vacuum, the size of the bore and stroke of engines, compression ratio, and the like.

Variations in the speed of the different cylinders may cause a regular or irregular drop of the vacuum reading. For example, a sticking valve that operates all right some of the time would show an irregular drop of the vacuum reading, whereas a leaking valve would show a regular drop of the vacuum reading.

A gauge that is fluctuating all over the dial may attempt to point to various troubles all at the same time. By the process of elimination it is possible to eliminate one trouble at a time until the highest and most steady vacuum reading is obtained. This elimination of troubles should be worked out in the proper order as given in the engine tune-up procedure given in the *Job Test* at the end of this article. A leaking valve can be distinguished from a faulty spark plug which usually acts in the same way (a regular dropping of the vacuum reading from 1 to 2 points) by temporarily eliminating the leaking valve by squirting penetrating oil into the carburetor airhorn and testing the spark plug. Or better still, a new plug substituted for the old one.

Carburetor mixture troubles can be due to other reasons than improper jet sizes and adjustments. For instance, there may be leaking of air at the manifold gasket to block, manifold gasket to carburetor, leaks in the windshield wiper hose, vacuum spark control, or vacuum brake connections, and other vacuum accessories. With extreme faulty carburetor mixture troubles, the vacuum reading may float from 3 to 5 in. lower than the high normal reading, whereas a slight faulty mixture trouble may cause a steady low reading 2 in. less than normal which is similar to reading obtained on an engine with improper ignition timing.

A great deal of help in learning to use

JOB TEST ON VACUUM GAUGE

Student's Name..... Repair Order No.....

Date..... Car Name and Model.....

Check.....

The Vacuum Gauge: Note—Answer question No. 1 before proceeding with the second step in the directions, etc.

Directions:

1. Run engine at idle speed until temperature gauge reads normal operating temperature.
2. Attach the hose of vacuum gauge to the intake manifold, windshield wiper connection, or as close to manifold as possible.
3. Notice if vacuum gauge shows normal high, steady reading; if not proceed as in the following steps.
4. Connect tachometer to engine. Notice the original position of the carburetor throttle valve location screw slot and also the position of idle mixture screw slot. Turn screws to the left or right to attempt to obtain highest, steady vacuum reading at the specified idling r.p.m. If this does not help the situation return screws to their original positions.
5. Notice the original position of the pointer with relation to the ignition advance and retard marks at the distributor. Advance or retard spark to attempt to obtain highest, steady vacuum reading. If this does not help the situation return pointer to its original position. (Retarded spark is indicated by lack of engine pick-up and vacuum at 2 to 3 in. below normal).
6. If the vacuum gauge reading drops one or more points below normal, notice if it is a regular or irregular drop. (Check spark plugs, tappet clearance and squirt penetrating oil in carburetor to eliminate troubles caused by leaking, sticking valves and spark plugs.)
7. Push accelerator down, then let it up. Vacuum should drop to about 5 in. and come back to about 24 in. if piston-ring and valve condition is good. (Double check with compression gauge.) If the gauge shows a vibrating reading as it approaches normal it indicates weak valve springs.
8. Check for back pressure and have job approved and checked.

Questions:

1. What is the specified normal operating temperature? .....
2. What is the manufacturers' specified idling r.p.m.? .....
3. Did the vacuum gauge show a normal high, steady reading? .....
If so, what was the reading? .....

Correction Attempt	*Gauge Reading* Before Adjustment* Yes	No	*After Adjustment*
4. Was carburetor out of idling adjustment?	....	..	....
Did you return screws to original positions?	....	..	
5. Was distributor timing out of adjustment?	....	..	....
Did you change distributor timing to the original position?	....	..	
6. Did you test spark plugs?	....	..	....
Were any of the spark plugs faulty?	....	..	
Did you check tappet clearances?	....	..	....
Were adjustments necessary?	....	..	
Did you attempt to eliminate sticking valves, at least temporarily with penetrating oil?	....	..	....
7. Did you test for faulty piston-ring and valve condition?	....	..	....
8. Explain the procedure in checking for back pressure.			

*If gauge reading drops, fluctuates, or vibrates, give both the high and low point.

the gauge may be had by purposely setting up a faulty condition as placing an extra thick feeler gauge between the valve push-rod and rocker on an overhead-valve engine and observing the effect on the vacuum gauge, etc.

The compression gauge can also be used as a double check to determine if trouble is caused by a faulty piston-ring condition or valves. The definite location of trouble as worn valve guides, improper tappet clearance, weak valve springs, etc., may require inspection or tear-down or both.

CABINET DRAWING

W. W. STURTEVANT
South High School
Minneapolis, Minn.

(Continued from page 392 of the November, 1944, issue)

Plates 12, 13, 14, and 15 show how line shading may be used to make clear the shape of an object of irregular surfaces that would be difficult to show if only the outline was drawn.

Plates 16, 17, 18, and 19 are problems for the pupil to copy.

Plate 20 shows a few working drawings that may be translated into cabinet drawing to test the pupil's ability to make a cabinet drawing and also to test his ability to read the working drawing.

When the pupils have completed enough of the practice exercises to have developed some facility in making cabinet drawings, they may be allowed to copy one or two cabinet drawings of simple machine parts or castings, and then asked to make cabinet drawings of a few more machine parts shown as working drawings.

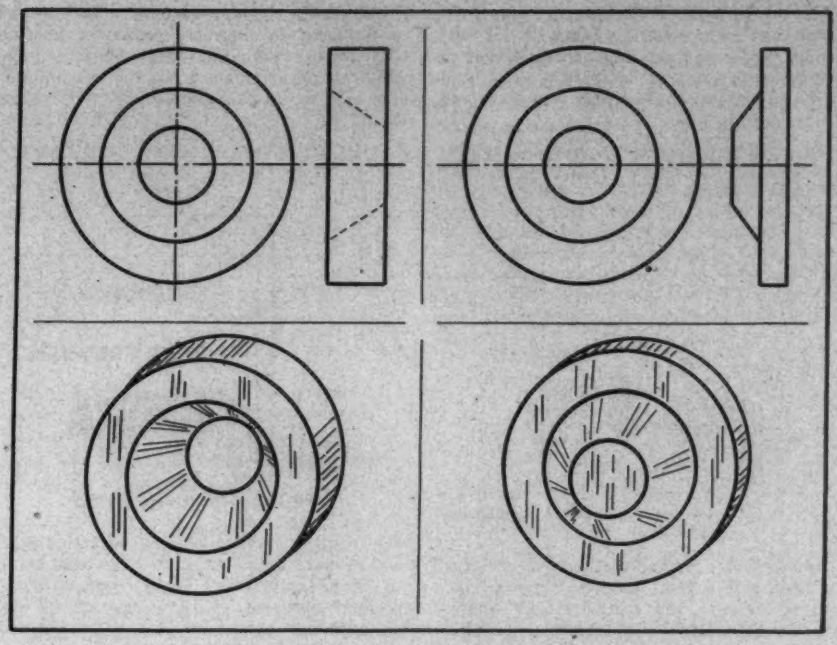


Plate 12

This translation of working drawings into cabinet drawings is good practice in blueprint reading as well as good practice in making cabinet drawings.

The working drawings should be carefully looked over to be sure that they do not present any difficulties that will make a good pictorial drawing impossible.

Objects of irregular shape may be drawn in cabinet drawing by first drawing an enclosing solid in light lines as is shown in the drawings of the pyramids on Plate 9. The light con-

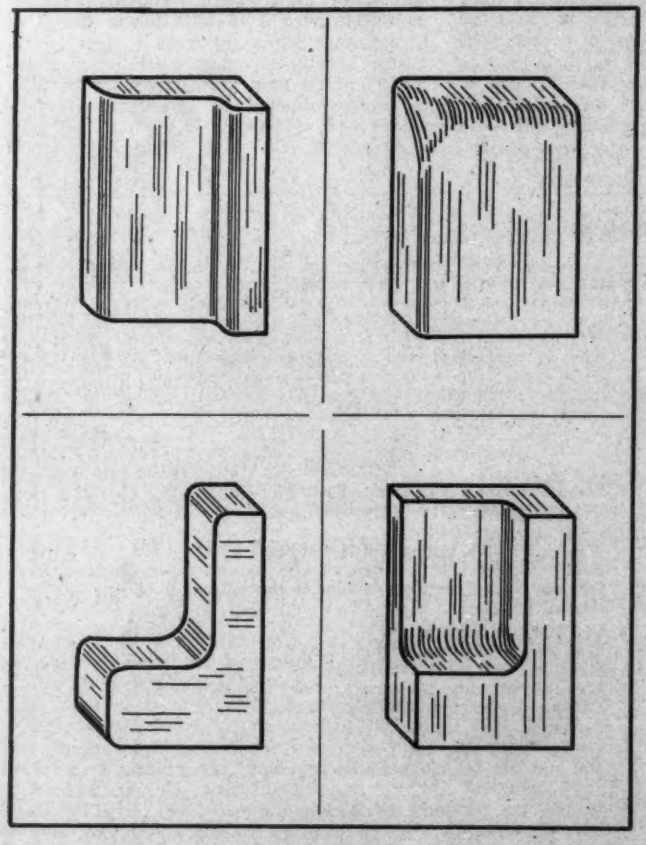


Plate 13

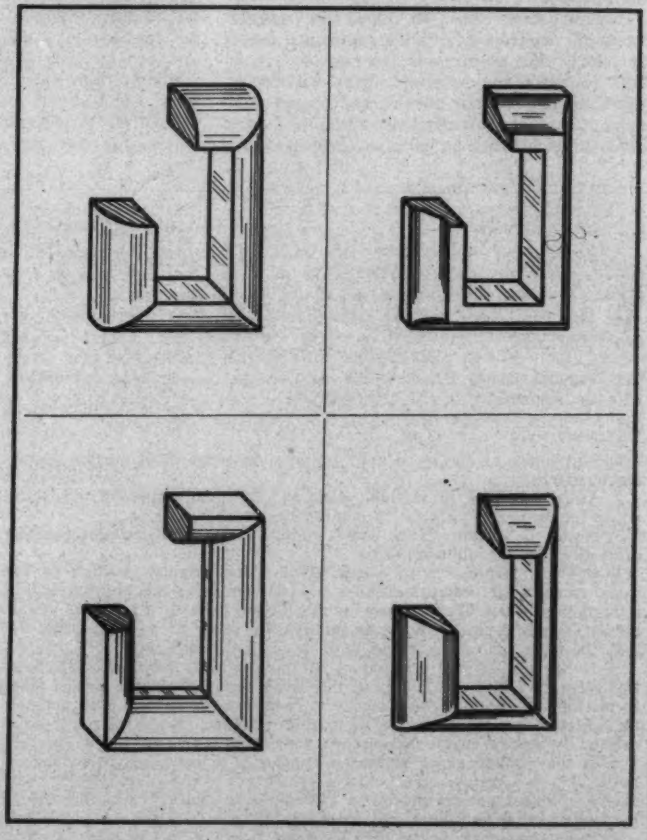


Plate 14

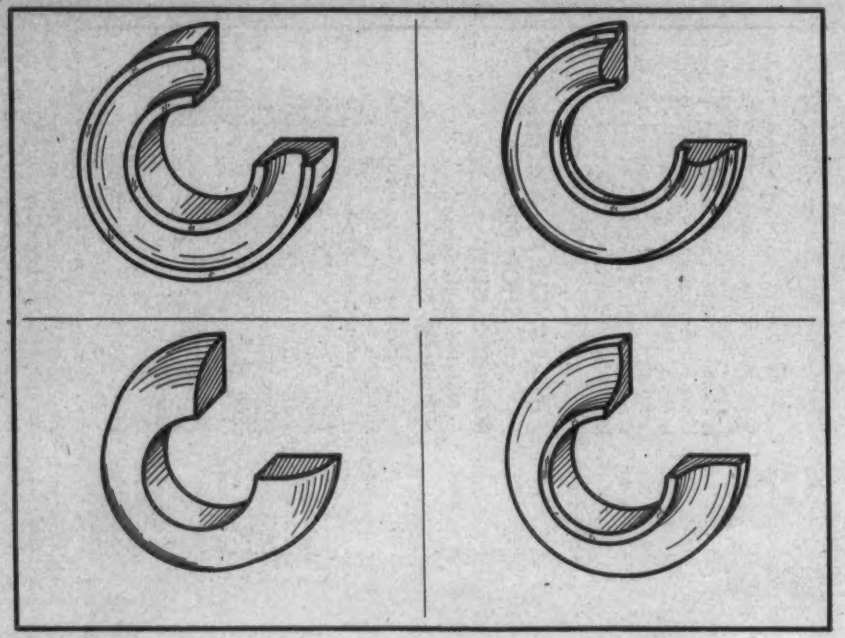


Plate 15

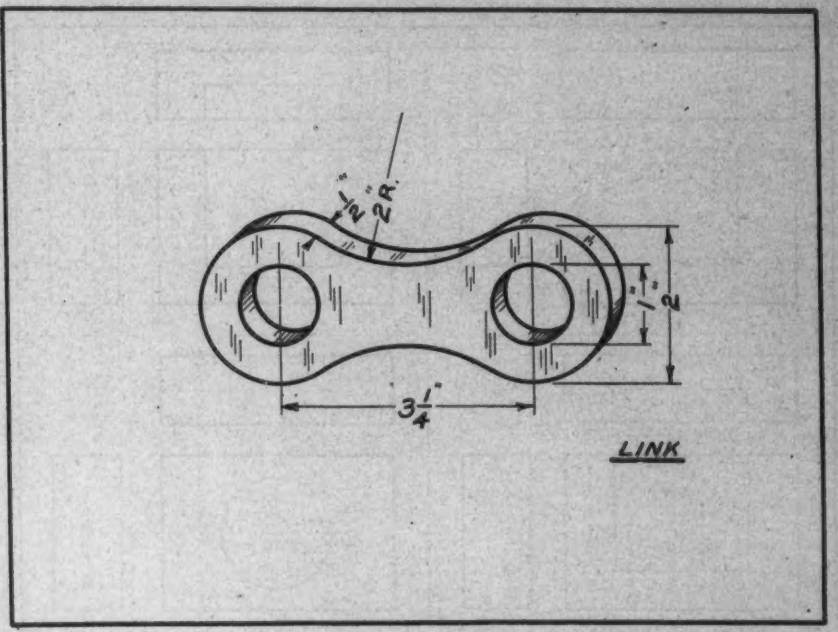


Plate 16

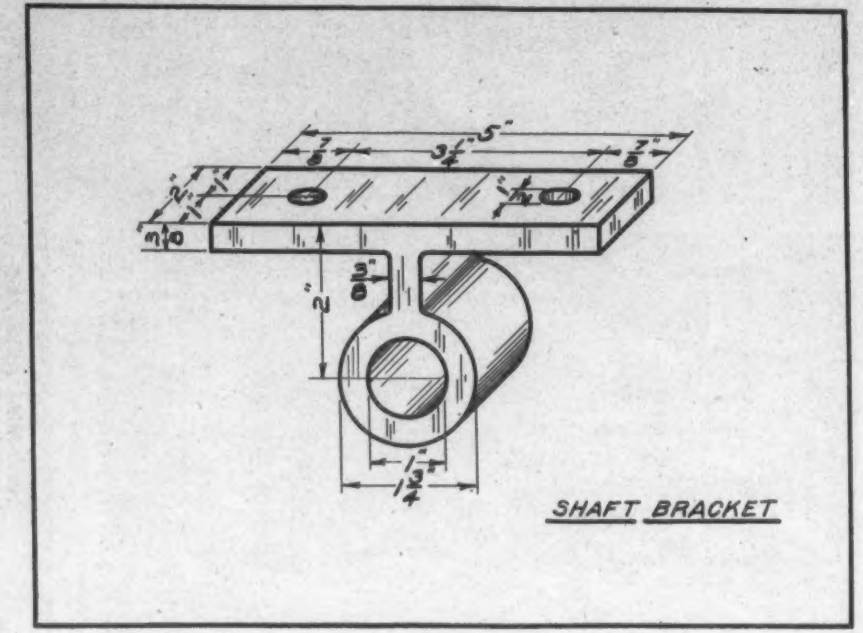


Plate 17

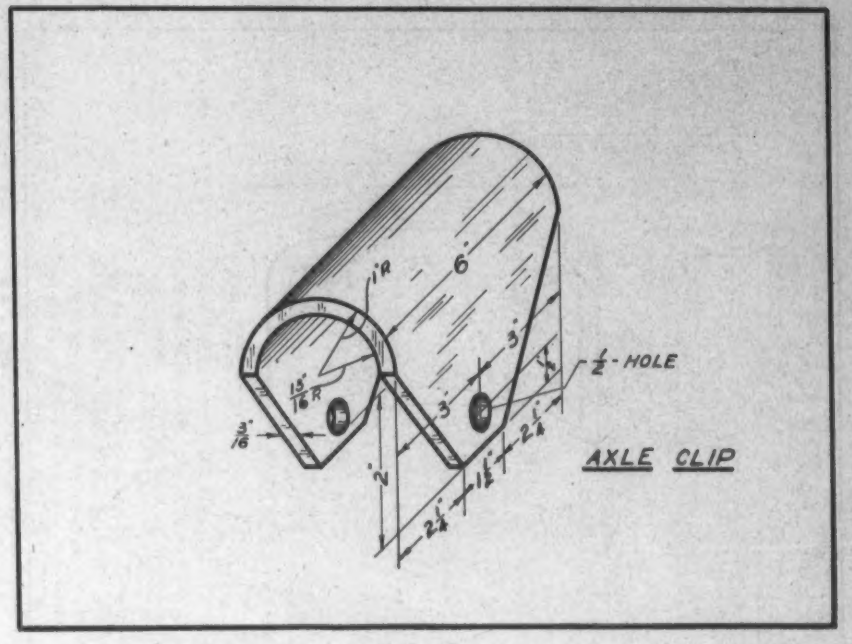


Plate 18

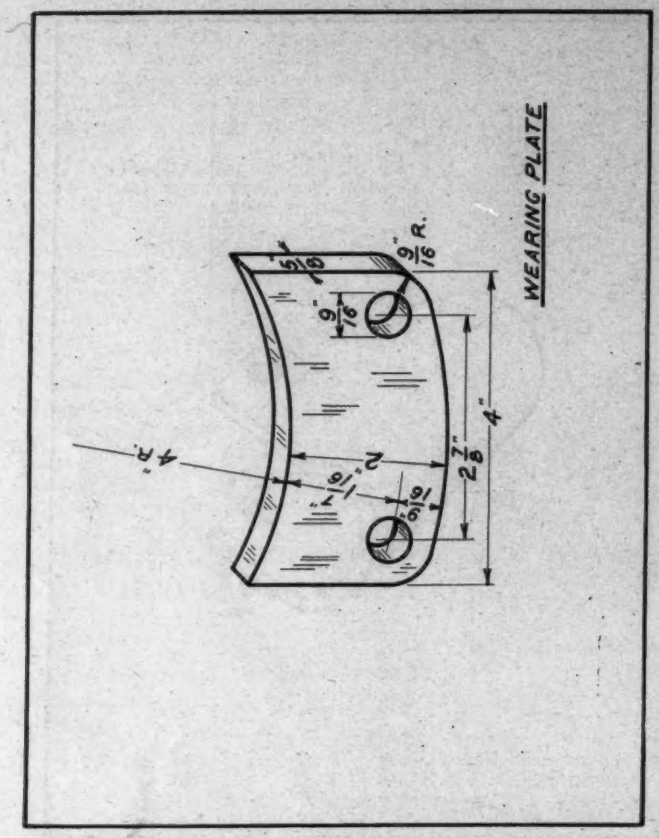


Plate 19

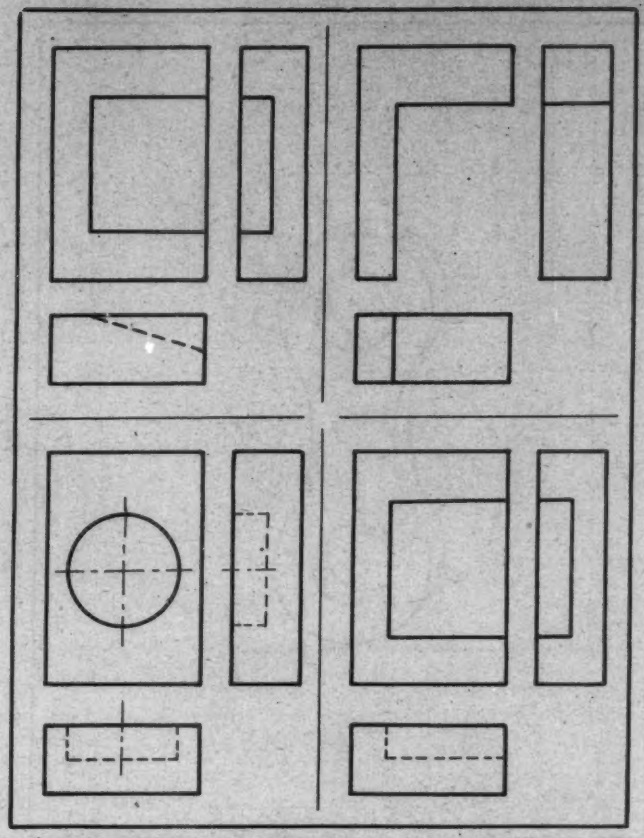


Plate 20

sruction lines should not appear on the finished drawing, but are shown here to explain the method.

Fillets and slightly rounded corners on castings may be disregarded and these corners drawn with straight lines as though the corners were sharp.

Pictorial drawing has value as a means of expression, as a method of developing technique in drawing, as a medium affording opportunity for drill in the handling of drawing instruments, as an aid to reason out problems and make drawings according to established rules, and finally as a teaching device to be used in the teaching of blueprint reading.

In addition it has more than a little value as an interest gainer as it is usually taken up with a good deal of enthusiasm on the part of the pupils. Also pictorial drawings make an appeal to parents, academic teachers, and principals that is often lacking with working drawings as these groups do not understand the working drawing.

This short discussion and the few suggested exercises and problems are offered with the hope that they may prove of some slight value to those teachers of mechanical drawing who have not so far devoted any of their time to pictorial drawing.

SURPLUS PROPERTY ACT

The Surplus Property Act of 1944, Public Law 457, was passed late in September. This act establishes in the Office of War Mobilization a Surplus Property Board of three members, to be appointed by the President, to dispose of surplus property. The three members have not, as yet, been appointed.

Section 13 of this act provides for the disposal of such property to local governmental and nonprofit institutions and carries in several of its subsections provisions of particular concern to eligible educational institutions.

An Office of Education Committee is now formulating proposals to be submitted to the Surplus Property Board for effectively determining the needs for surplus property for educational needs in the various states.

At the suggestion of the Surplus War Property Administrator, the following continuing committee has been appointed to work with the Office of Education and the Surplus War Property Administrator.

This committee consists of:

H. F. Alves, chief, Division of School Administration, Office of Education — chairman;

B. C. Ahrens, executive secretary, National Educational Buyers Association, New York, N. Y.;

H. H. Armsby, field co-ordinator, ESMWT, Office of Education;

Ward P. Beard, executive assistant in vocational education, Office of Education;

L. H. Dennis, executive secretary, American Vocational Association, Washington, D. C.;

J. H. Goldthorpe, research associate, American Council on Education, Washington, D. C.;

Frederick G. Hochwalt, secretary general, National Catholic Educational Association, Washington, D. C.;

John W. Lewis, assistant superintendent of city schools, Baltimore, Md.;

W. A. Lloyd, director of information, Association of Land Grant Colleges and Universities, Washington, D. C.;

R. B. Marston, director, Legislative and Federal Relationship Division, National Education Association, Washington, D. C.;

T. G. Pullen, Jr., state superintendent of schools, Baltimore, Md.;

Howard L. Bevis, president, Ohio State University, Columbus, Ohio;

J. Harvey Cain, chief auditor, Board of Higher Education, Hunter College, New York, N. Y.;

H. W. Loman, purchasing agent, Pennsylvania State College, State College, Pa.;

N. L. Engelhardt, president, American Association of School Administrators, and associate superintendent, New York Public Schools, Brooklyn, N. Y.; and

Ralph C. Hutchison, Association of American Colleges, Washington and Jefferson College, Washington, Pa.

THE BICYCLE AS A CLASS AND SHOP PROJECT

ROLAND C. GEIST
Newton High School
Elmhurst, N. Y.

The great popularity of bicycles among youths of secondary school age suggests that school administrators use both the bicycle and the sport of riding in the shop and classroom. Back in the "Golden Eighties" novices were taught to ride a wheel correctly in so-called bicycle academies located in most large cities in the United States. The cycling youth of today must compete with heavy auto traffic moving from thirty to fifty miles an hour on the open highways, without a single lesson in traffic regulations and safety rules. Only the insurance companies have aimed to focus attention on this problem.

The bicycle lends itself very well to projects in many subjects in the high school curriculum. There are few students who have not owned or ridden a bicycle. Most students have seen or been in some sort of traffic tangle themselves. The mere mention of the word bicycle is meaningful to every youth;

to one it means a picnic, to another a race, to another a means of getting to school and saving carfare.

Where and when shall these projects pertaining to cycling be used:

Automotive or Safety Course

1. The rights and liabilities of the cyclist on the highways
2. The ten safety rules for all cyclists
3. Keeping the bicycle itself in good condition
4. Traffic problems (cyclist vs. the autoist)
5. Cycling safety tests as developed by New York University for high school and college youths
6. First aid for the cyclist
7. Cycling during a blackout
8. Cooperation with the police and public officials
9. Awarding of the "Competent cyclist certificates"

(Also the education of the auto driver to be alert and courteous to the cyclist by not passing too close at high speed, giving proper signals, not cutting in front of the cyclist, no excessive horn blowing to scare the cyclist, etc.)

This may be accomplished by class lessons, demonstrations in class and in assembly, motion pictures, slides, radio talks, charts, and visits to the traffic courts.

Consumer Education Courses

1. The buying of a bicycle, especially in war time (ration certificates)
2. The care of the bicycle and its great importance
3. A study of the raw materials and manufacture of the bicycle
4. Types of bicycles and their uses (foreign vs. domestic products)
5. Registration and taxation of bicycles
6. The selling of a bicycle
7. Bicycle gadgets, which to buy and which not to buy
8. The storage and shipping of bicycles
9. How to enjoy the bicycle (American youth hostels)
10. A study of the new Victory model

This opens an opportunity for students to become bicycle dealers and repairmen. Reference work in this field is available in most school libraries. A few books and many magazine articles have been written on the topics mentioned. In buying a bicycle emphasis should be placed on the use to which the bicycle is to be put—a touring model for picnics, a lightweight for racing, etc.

Mechanical Drawing Projects

1. A simple bicycle rack. Bicycle Rack, *Popular Science* for October, 1942. Bicycle Garage, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, page 263, June, 1942.
2. Detail drawing of frame and wheels
3. Drawing of a fixed gear and chain
4. The American coaster brake
5. The external gear shift (three speed)
6. The internal gear shift (English Sturmey Archer)
7. The complete working drawing of a bicycle

It should be of greater interest to a student to make a working drawing of his own bicycle rather than of a locomotive part, a stamping machine, or optical grinding machine which he will probably seldom if ever see, and the operation of which he will most likely not understand.

Woodworking Shop

1. A wood bicycle rack, both individual for the home, and for a number for school yard use
2. A bicycle storage shed
3. A portable wooden crate or packing case for shipping a wheel
4. Display rack for a dealer
5. Ramps, for school and home use
6. Wood bicycle basket or luggage carrier
7. An experiment in testing the strength of various types of wood bicycle rims, such as maple, hickory, ash, etc.

Before Christmas an advanced class might make small wood pins and novelties such as the old high wheels, boneshakers, etc., for gifts.

Machine Shop

1. The metal bicycle stand (folding) for home, shop, and store
2. Metal food carriers
3. Building a side car (very popular in England)
4. Building a bicycle trailer
5. Repair of metal parts
6. Taking down and reassembling the gear shift, coaster brake, and hangar
7. Constructing a tandem out of two single bicycles
8. Constructing a quadricycle out of two single bicycles

The whole bicycle may be taken apart, cleaned, parts replaced and wear noted as a project in itself. Gadgets of all kinds may be made such as luggage carriers, rear lights, etc.

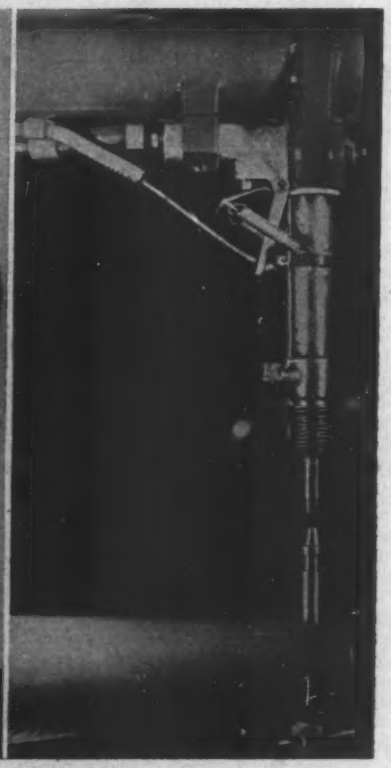
The School Bicycle Club

1. Name, constitution, meetings, membership, etc.
2. Lectures on safety, hosteling, tours, etc.
3. A bicycle show, prizes for cleanest, lightest, most practical, etc.
4. Planning tours, century runs, and picnics
5. Report on literature pertaining to bicycles
6. Buying, care, and adjustment of a bicycle
7. Law and the cyclist
8. The six-day race and the famous "Tour de France"
9. Records awheel and famous American and foreign champions
10. Trick riding, Walter Nilsson, Shyrettos, Joe Jackson, etc.
11. Shall "We Register and Tax the Bicyclist?"
12. Correct cycling costumes for men and women
13. Cycle camping and cycle polo
14. The American youth hostels and cycling
15. The bicycle in war time for both soldier and citizen

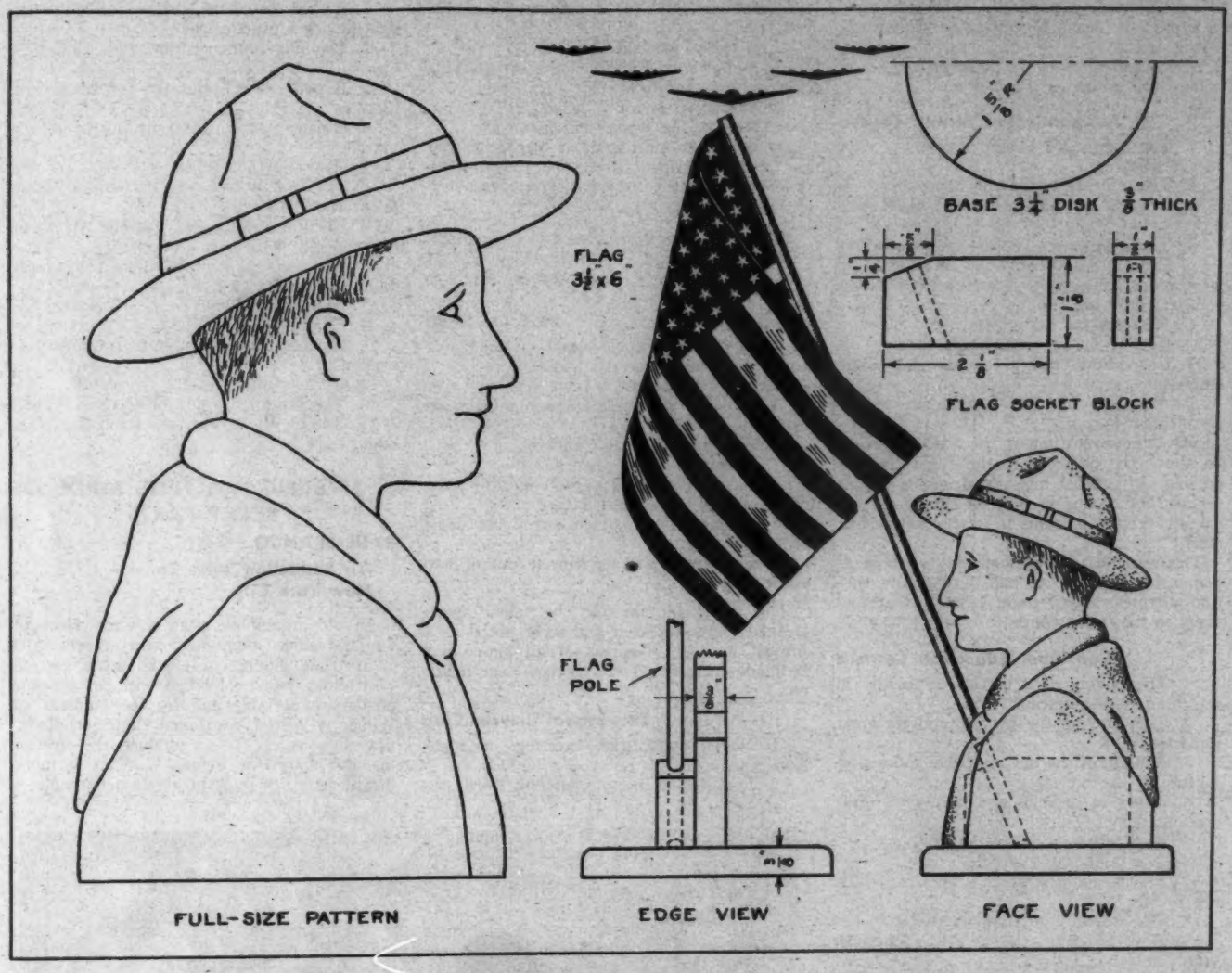
A RIVETING MACHINE MADE OF SCRAP PARTS

PAUL FRANCO
Air Reduction Sales Co.
New York City

An old automobile gear, a scrap piece of 4-in. galvanized pipe, some stray pieces from an airplane landing gear, and some cast-off Ford axles, were combined with an obsolete pneumatic portable gun by the students of Woodrow Wilson Vocational High School Annex, Jamaica, L. I., to produce the riveting machine shown in Figure 1. What is more, it will drive 200 5/32-in. rivets per minute.



Left: Fig. 1. The riveting machine made of scrap parts
Right: Fig. 2. Close-up of the rivet gun and the dolly bar
Courtesy — Air Reduction Sales Company



Dynamic flag stand

The students scoured their own and neighboring junk piles, and dug up enough scrap material, which when welded and brazed together, made the base and frame.

An old automobile gear was used for the base, and a cone-shaped metal cap was neatly fitted over it for the sake of appearance. The galvanized pipe served as the column, and also as a reservoir for compressed air. The horizontal arms were fabricated of an airplane landing gear, and the *dolly bar* (back-up for the rivet) was turned out in the machine shop from an old Ford axle.

The hose to the riveting gun is an old pneumatic hose once used on paving breakers, and was contributed by a contractor. The valve shown in the line leading to the top of the column, Figure 1, was reclaimed from a plumbing shop. The regulator just below the valve is an old oxygen regulator which was drilled out to give the required flow of compressed air. The machine operates at a pressure of 60–80 psi.

The only materials purchased to make this machine were 220 cubic feet of oxygen; 150 cubic feet of acetylene; seven pounds of Airco No. 7 steel rods, and one pound of Airco No. 20 bronze rods.

DYNAMIC FLAG STAND

JOS. J. LUKOWITZ
Milwaukee, Wis.

The Boy Scout flag stand illustrated herewith appeals strongly to all boys. It has a dynamic aspect not usually found in other flag stands.

The construction requires very little material and the tools and processes involved help achieve the objective of any elementary woodworking course. The cutting and smoothing of the profile seems to encourage more careful workmanship than work on some other projects. Perhaps this is so because boys instinctively realize that slight deviations from the line when cutting a human form will produce very unsatisfactory, even ludicrous results.

Plywood is not required for this project. Basswood is a good wood to use. Select white sapwood which is free of grain markings which would be intensified when the finish is applied. The hat, face details, and neckerchief may be outlined with a rather heavy pencil line or with a 1/16-in. gouge.

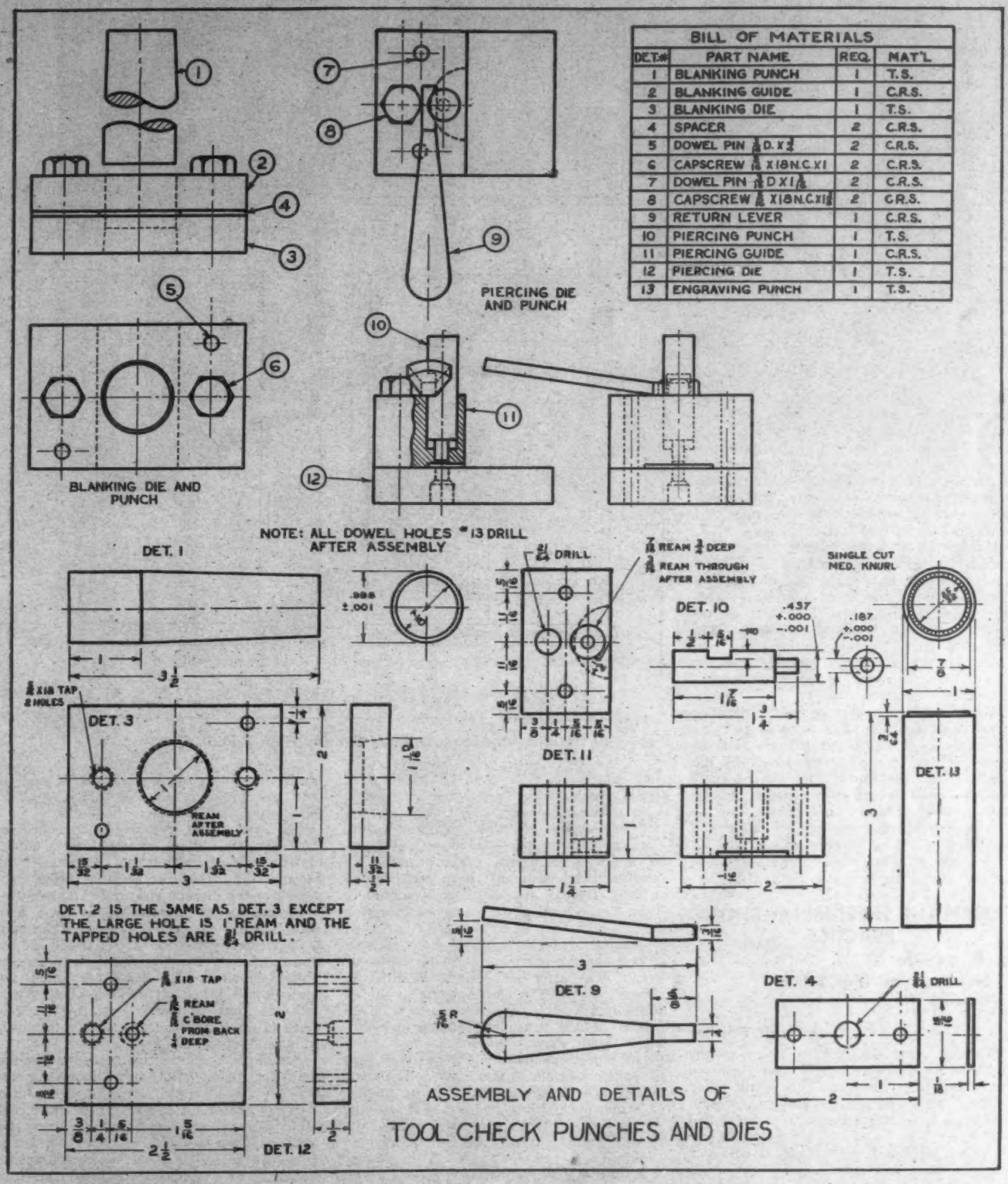
An excellent wartime finish, one which does not require paints or enamels and consequently saves brushes as well, is to stain the hat, coat, and base a light brown, using water stain. Use little stain on the brush when staining near the face and neckerchief to prevent the stain from running along the grain by excessive absorption of stain at these points. The neckerchief may be colored with wax crayons, using red, yellow, blue, or any other suitable color. The face is not colored, with the exception of a little red applied on the cheek. The cheek should be rubbed with a cloth to soften the coloring. By simply drawing the red crayon carefully over the mouth two thin red lines will be produced to represent lips. The eye may be detailed with a pencil. When these details are finished give the entire project two or three coats of wax. The wax will produce an excellent flesh color on the face due to the color of the basswood. An alternative finish would be show-card colors instead of water stain. If show-card colors are used cover them with white shellac.

MAKE YOUR OWN TOOL CHECKS

H. W. BABCOCK
Detroit, Mich.

The war has made tool checks very difficult to obtain. They are easily lost, and sometimes destroyed, so it is necessary to find a good substitute or make your own.

The punches and dies for turning out standard, round, 1-in. diameter checks are an interesting project for high school machine-shop students. When finished they are light enough to operate on the average arbor press


BILL OF MATERIALS
DET.# | PART NAME | REQ. | MAT'L
1 | BLANKING PUNCH | 1 | T.S.
2 | BLANKING GUIDE | 1 | C.R.S.
3 | BLANKING DIE | 1 | T.S.
4 | SPACER | 2 | C.R.S.
5 | DOWEL PIN 3/8 D. X 3/4 | 2 | C.R.S.
6 | CAPSCREW 5/16 X 18 N.C. X 1 | 2 | C.R.S.
7 | DOWEL PIN 7/16 D X 1 1/8 | 2 | C.R.S.
8 | CAPSCREW 3/8 X 16 N.C. X 1 1/2 | 2 | C.R.S.
9 | RETURN LEVER | 1 | C.R.S.
10 | PIERCING PUNCH | 1 | T.S.
11 | PIERCING GUIDE | 1 | C.R.S.
12 | PIERCING DIE | 1 | T.S.
13 | ENGRAVING PUNCH | 1 | T.S.
PIERCING DIE AND PUNCH
BLANKING DIE AND PUNCH
NOTE: ALL DOWEL HOLES #13 DRILL AFTER ASSEMBLY
DET. 1
DET. 3
DET. 2 IS THE SAME AS DET. 3 EXCEPT THE LARGE HOLE IS 1" REAM AND THE TAPPED HOLES ARE 21/64 DRILL.
DET. 12
DET. 11
DET. 10
DET. 13
DET. 9
DET. 4
ASSEMBLY AND DETAILS OF
TOOL CHECK PUNCHES AND DIES

Tool checks by H. W. Babcock, Detroit, Mich.

or between the jaws of a bench vise. The students enjoy using them and get real experience in tool and die design and construction.

Hundreds of checks may be made with very little wear and tear on the die. Any type of scrap sheet metal between sixteen and twenty gauge is satisfactory. The average high school boy can find lots of scrap and is always glad to bring it in for such uses. An old brass horn was flattened out and used very successfully. A broken aluminum coffee percolator furnished metal for about four dozen checks. The aluminum covers from an old order book served in the same way. It is necessary to flatten the metal out and to cut it into strips not over 1⅛ in. wide.

The material list for the dies calls for tool steel in several of the parts. This is not entirely necessary. Cold-rolled steel parts that have been casehardened will serve nearly as well. It was found that construction rods used in reinforcing concrete are an excellent material for the punches. It may be easily hardened and drawn, and wears indefinitely.

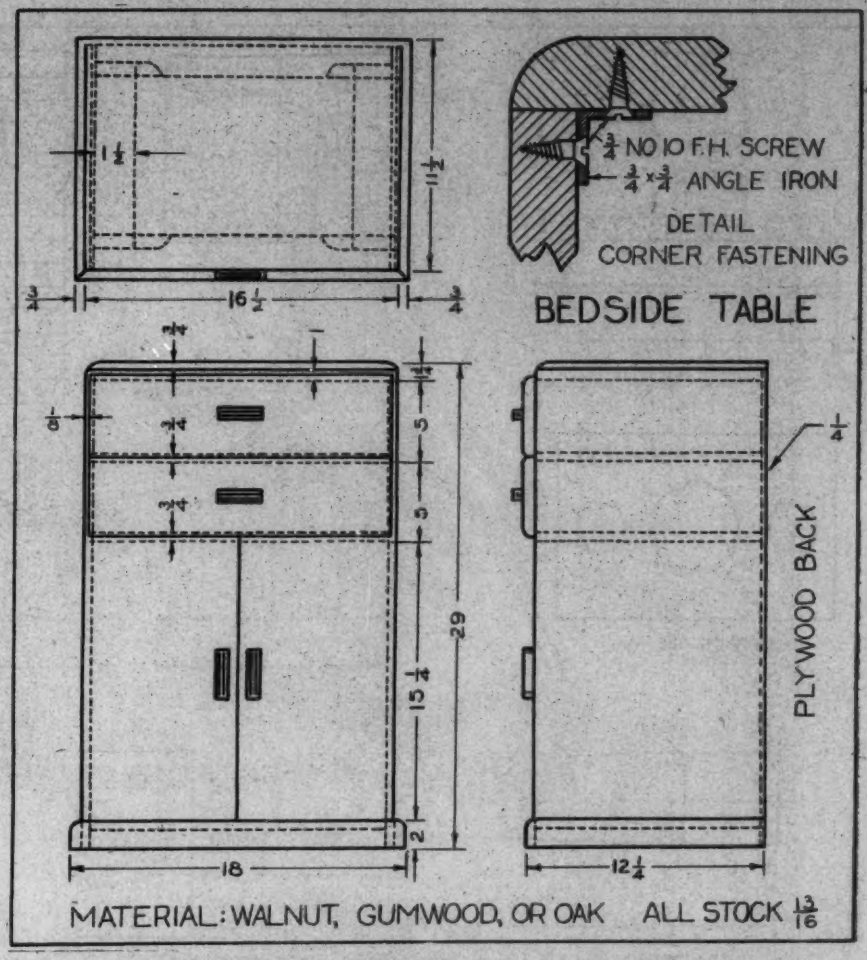
Making the blanking die and punch: De-

tails 2, 3, and 4 are made to dimensions except for the dowel holes and the die holes. They are then assembled with two cap screws. The dowel holes are then drilled and the pins driven in. The die assembly is set up in the lathe in a four-jaw chuck. The 1-in. reamed hole is first drilled, then bored to about .995 in. and reamed with a 1-in. hand reamer. The die is then taken apart and the details marked so it may be assembled properly. Detail No. 3 is bored out on the back for clearance to 1/16 in. This piece is then hardened and the die is reassembled. The punch, detail No. 1, is easily made on the lathe and then hardened and drawn.

Making the piercing die and punch: Details 11 and 12 are made and assembled the same as the blanking die. The machining operations are done entirely on the drill press. This die is then taken apart. Detail 12 is hardened and drawn. Detail 11 is set up in the lathe in a four-jaw chuck and the counterbore 1/16 in. by ⅛ in. radius is bored out at the bottom. The die is then reassembled. The piercing punch, detail No. 10, is a lathe and milling machine job. It too is hardened and drawn. Detail No. 9, the return lever, is not fastened to the die but is a necessary accessory in drawing the piercing punch out of the work. The pierced hole is larger than is usually found in tool checks. This makes them easier to remove from their rings and easier to hang on the tool crib hooks.

Making the engraving punch: Detail 13 is a short lathe job. The marking on the end is accomplished by setting the job up in a chuck and using one wheel only of a standard medium knurling tool. The burrs are removed, the punch hardened and drawn, and the job is done. No guide or locator is furnished for the punch. It is merely lined up by eye over the check and given one smart blow with a hammer.

Actual production may be carried through in the manufacturing of tool checks by using six students. The first two prepare and cut the stock into strips; the third operates the blanking die; the fourth does the piercing; the fifth uses the engraving punch; and the sixth removes any burrs and lightly taps the checks with a broad hammer to flatten any distortion caused by the engraving punch.



Designed by Louis Barocci, Cudahy High School, Cudahy, Wis.

AIRPLANE SHEET-METAL SHOP PRACTICE

M. D. CAFFIN
East Technical High School
Newark, N. J.

Aircraft Finishes

Careful attention must be given to the finish of airplane parts. The chief factor to be considered is corrosion. This is true of all types of airplanes, and particularly seaplanes which are constantly exposed to moisture and salt water.

Alclad parts and those made of corrosion resisting steel and monel metal are usually left without further finish since they are naturally immune to corrosion. Other metals and alloys must be *cleaned, plated,* or *anodized* and *painted.*

Heat treatment of all parts must be completed before the finishing process is begun.

Cleaning: Two methods of cleaning are used, namely, pickling and sandblasting. The more widely used of the two methods is pickling since it has been found inadvisable to sandblast aluminum alloy. They are too soft and usually too thin for sandblasting. The *sandblasting* operation consists of blowing a fine grit through a nozzle under air pressure. Steel parts that have been welded or heat treated are normally sandblasted. After this operation the parts must not be handled with dirty or greasy hands, and must be given a protective coat of paint as soon as possible. All parts are further cleaned by an air blast after sandblasting in order to remove all grit. If electroplating is to be done after sandblasting, steel parts only are further cleaned in a dilute solution of hydrofluoric acid. *Parts requiring a high finish should not be sandblasted. Care must be used in sandblasting not to wear tiny holes or pits in the piece being cleaned. Pickling* consists of immersing parts to be cleaned in a dilute solution of sulphuric or muriatic acid. Parts to be electroplated are then rinsed and electroplated.

Plating: Cadmium plating is generally used on aircraft parts. Small steel parts are all cadmium plated before being painted. *Aluminum is not cadmium plated,* but is anodized.

Anodizing: This process actually is not a plating process but consists of producing an aluminum hydroxide surface on the aluminum. This surface then has good corrosion resistance, and provides an excellent base for paint. Since an anodized surface is soft and easily scratched, a coat of primer is applied before painting. All aluminum or aluminum alloy parts must be anodized on Army and Navy planes, except alclad. A steel tank is used to hold the anodizing solution which consists of chromic acid in water.

The parts to be treated are suspended in the electrolyte and are connected to the anode or positive electrical terminal. The steel tank becomes the cathode or negative, being connected to the cathode electrical terminal. 20–40 volts d.c. are supplied usually by a generator. The electrolyte is kept at a constant temperature between 91 and 100 deg. F. by iron pipe coils. After treatment the parts are washed in clean fresh hot water, dried, inspected, and a coat of primer applied. When alclad is to be painted it must first be anodized in order to provide a surface to which paint will adhere.

Painting: A priming coat is used before the finish coat to provide a good base for the finish coat. The priming coat is applied to aircraft parts before assembly, and the finish coat after assembly. Red iron oxide primer and zinc chromate are used for priming coats. Of the two, the use of the zinc chromate seems to have become more universal. Iron oxide primer is brownish red. It dries in about 1½ hours, and is satisfactory for use under metals to be painted with oil enamels, but not with nitrocellulose lacquers or enamels. Zinc chromate is greenish yellow in appearance, dries in five minutes, and can be used with oil enamels or nitrocellulose lacquers. It must be sprayed because of its rapid drying qualities. It will adhere to cadmium plated parts only if they are given a chromic acid dip and are clean. Since zinc

(Continued on page 22A)

. . . from one little reel

The postwar market — a market of new materials, new products, and new customers. Those who adjust their manufacturing, training and marketing methods to the faster, more efficient tempo made possible by Victor 16mm Magic will be the leaders. Quick reconversion to peacetime production methods through the intelligent use of training films; training of sales and service personnel rapidly and thoroughly; demonstrating and selling to a million customers at a time — scattered all over the world, speaking a score of languages, will be essential for postwar industry and business.

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STARRETT TOOLS

Precision Tools — Dial Indicators — Ground Flat Stock — Hacksaws — Metal Cutting Band Saws — Steel Tapes

(Continued from page 42)

chromate dries so rapidly it permits handling of the parts shortly after they are sprayed. This has speeded up finishing operations considerably.

Varnish: Aircraft spar varnish is used for outside exposed surfaces of wood, metal, and doped fabric. It is also used as a base for aluminum pigment and aircraft enamels. Aluminum pigmented varnishes are being widely adopted because of their corrosion resisting qualities.

Soya bean oil compound: This consists of a compound of soya bean oil, ester gum, and china wood oil mixed with a small amount of turpentine. It is used as a *seam compound* to make metal hulls and floats waterproof. It takes about six days to dry thoroughly.

Personal News

WELL-KNOWN EDUCATOR PASSES

John I. Sowers, supervisor of industrial education, Miami, Fla., died on Sunday, November 19, 1944, after a short illness.

Mr. Sowers was born at Springfield, Ohio, in 1875. He attended the high school in that city, and then entered Valparaiso University, Valparaiso, Ind., and received his bachelor's degree from that institution. He took postgraduate work at The Stout Institute, Menomonie, Wis., and at the University of Wisconsin, Madison, Wis.

He taught at St. Paul, Minn., for five years; was head of the department of industrial education at the School of Forestry and Agriculture in North Dakota for two years; vocational director, Vincennes, Ind., for seven years; vocational adviser, Federal Board for Vocational Education, Washington, D. C., for one year after World War I; and has been supervisor for industrial education at Miami, Fla., for many years.

John I. Sowers

He is the author of several books and has done much writing for trade and educational magazines. Besides this, he has always been very active in local, state, and national educational associations. His death is a distinct loss to industrial arts and vocational education.

ADNAH CLIFTON NEWELL DIES

Adnah Clifton Newell died at his home in Pasadena, Calif., on November 2, 1944, after having been in poor health for several years. He was widely known for his work at Illinois State Normal University at Normal, Ill., where he served as head of the department of industrial arts from 1910 to 1935. He was retired in 1935 and moved to Pasadena where he spent his retirement days enjoying his hobbies of painting and magazine writing.

Mr. Newell was a graduate of the University of Michigan and had attended Boy View University, Columbia University, Bradley Institute in Peoria, Ill., and Cummings Art Academy. He taught manual training in Pueblo, Colo., was supervisor of industrial arts in Des Moines, Iowa, and taught industrial subjects in Highland Park Normal School. He had wide experience as a lecturer in summer school sessions at the University of Iowa and Oregon State College at Corvallis, Ore.

He came to Normal University, Normal, Ill., in 1910. Under his direction, his department became one of the chief training centers for industrial-arts teachers in the United States and throughout the world. Students from nearly every nation came under the influence of his teaching and returned to their homeland to further his philosophy of industrial-arts education. Thousands of young men and young women will pay tribute to him as representing all of those fine qualities which go to make up the ideal teacher. He was a Christian gentleman, kind, sincere, sympathetic, and always believing in youth and its tremendous potentialities for service.

Mr. Newell was the author of two books, "Wood and Lumber," and "Coloring and Painting Wood." Both of his books are recognized as scholarly presentations of the subjects treated. For many years he was author of a page devoted to painting and finishing in the magazine, *Popular Homecraft*. He was truly a leader and valued servant in the field of education. He is survived by his wife. — *A. W. Dragoo.*

◆ DIRECTOR M. R. BASS, and ASSISTANT DIRECTOR GEO. B. RODENHEISER of the David Ranken Jr. School of Mechanical Trades, St. Louis, Mo., attended a special conference on Trade and Industrial Education on August 17 and 18, at Jefferson City, Mo.

(Continued on page 25A)

Through fifty-seven years of specializing exclusively in lathe manufacturing the trade-wise have learned that the name SEBASTIAN means more value for their lathe-purchasing dollar.

"Best Lathe In The Medium Price Field"

SEBASTIAN LATHES

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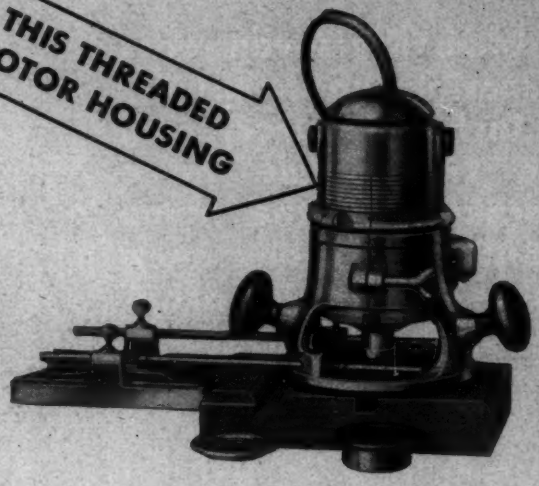

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You and your students will find this exclusive feature of Carter Routers a real time-saver. Adjustments for depth of cut can be made to .01 of an inch without measuring. Simply turn the threaded ring on the threaded motor housing—one complete turn raises or lowers the motor ⅛ inch in the base. And there's no need to handle the cutting bit once it's locked in the chuck.

This feature, plus the many jobs a portable router can be used for, makes Carter Routers "all purpose" tools for school shops. To get the whole story on Carter Routers, fill in coupon and mail.

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Stanley-Carter Tools
New Britain, Conn.
Gentlemen: Please send additional information about Stanley-Carter Routers for school shop use.

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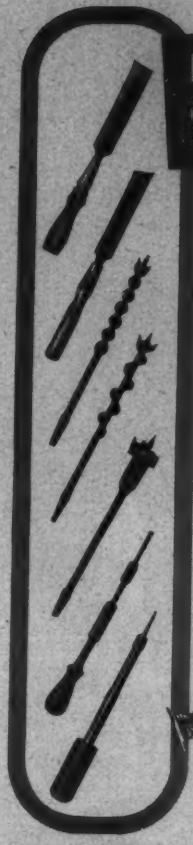

HAND TOOLS FOR THE CRAFTSMAN

CHISELS AND GOUGES — For all types of woodworking . . . GREENLEE chisels and gouges of *crucible steel*. Tough, lasting, fine cutting edges. Various types of socket, tang butt and firmer chisels, and gouges.

AUGER BITS AND DRILLS — For every need, all types of twists and heads. Cutting parts precision-sized to indicated diameter, true-square shank tapers, filed-sharp edges.

EXPANSIVE BITS — For fast, uninterrupted cutting . . . newly-designed wide, open throat for positive chip clearance. Two styles: Set-fast with quick adjusting-locking feature and Plain Expansive Bit.

SPIRAL SCREWDRIVER—Built for *years* of hard service, with special, long-lasting, phosphor bronze drive nuts to withstand heaviest wear. Adjustments are quick, simple, positive. Small, medium and large sizes —with or without spring return.

AUTOMATIC PUSH DRILLS — Completely enclosed working parts. Hardwood handle serves as magazine for 8 drill points supplied. Special phosphor bronze drive nut for long wear.

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SHOP MATHEMATICS AT WORK
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These two workbooks are concise, accurate, easy to use and teach. They provide the kind and amount of training that is needed in these fundamental skills.

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MECHANICAL DRAWING AT WORK
(in preparation)

SILVER BURDETT COMPANY
New York *Chicago* *San Francisco*

Detroit Public Library

(Continued from page 22A)

♦ ARTHUR HORSTMANN has joined the day school staff of the David Ranken Jr. School of Mechanical Trades, St. Louis, Mo., as instructor of mathematics, drafting, and science.

He has served as evening school instructor at that institution in various capacities since 1925.

♦ JOSEPH DE VIVO, CLYDE DILLON, ROBERT MCALISTER, FRANK SOUTHARD, H. E. ESSMANN, JENNINGS OERTLE, LESLIE R. TESSON, and DONALD WINTERS have all joined the evening school staff of the David Ranken Jr. School of Mechanical Trades, St. Louis, Mo.

♦ C. HAROLD LAUCK was awarded the Harry J. Friedman Memorial Medal for distinguished service in the Cause of Graphic Arts Education, at the graduation exercises of the Vocational High School Department of the New York School of Printing, on June 22, 1944.

♦ GLEN U. CLEETON, head of the Department of Printing, Carnegie Institute of Technology, Pittsburgh, Pa., was appointed Director of Humanistic and Social Studies at that institution on July 1, 1944.

♦ L. B. HEADRICK, instructor of aeronautics and mechanical drawing, has been appointed to serve as director of the vocational education evening program at El Dorado, Kans.

♦ WILLIAM H. HOWE, printing instructor at the Hammond High School, Washington, D. C., since 1921, has retired because of reaching the age limit.

♦ HENRY OLIVER, formerly printing instructor at North Phoenix High School, Phoenix, Ariz., met his death by naval action in the South Pacific.

♦ RALPH R. BLACK, instructor in printing, Eastern New Mexico College, Portales, N. Mex., has been appointed Lieutenant (jg) in the Naval Reserve. He reported for active duty June 15, 1944.

♦ WILLARD L. CONROW, Somerville, N. J., after having taught for 41 years, has retired. He was teacher in Somerville for 32 years.

♦ DOYLE KEMPER has been appointed as state supervisor of industrial arts, State Department of Public Schools, Jefferson City, Mo.

Association News

♦ In connection with the 90th Annual Convention of the New Jersey Education Association, State Vocational and Industrial Arts men met at the McAlpin Hotel ballroom on Friday afternoon November 10, 1944.

President L. Omer Asher presided and introduced the speakers.

The group was fortunate in having Dr. John H. Bosshart, the New Jersey Commissioner of Education present to offer some problems, among which were "What will soldiers do with technical education after they get it?" Industrial arts has never been developed in this country as it ought to be. The argument that we wanted to help the nonacademic student no longer holds. If the program were fully developed present shops would not be adequate. There should be a broader concept on the part of people as to what constitutes general culture. There should be no more separate avenues of education.

Mr. Roy Zimmerman of Hackensack said that a sound system of state support of public education would mean: (1) equality of opportunity for all children in the State; (2) more money in many school districts. The latter would increase salaries, school facilities, and offer more modern equipment.

It is unfair for one child to receive a $300 program and another in the same state a $50 program.

More financial state aid should be given to a district with low pupil wealth.

Mr. John A. McCarthy, assistant commissioner of education, Vocational Division, and president of the American Vocational Association, spoke on some of the year's developments and plans started after Pearl Harbor. "The war program is still in the picture; we have not won the war."

From 1940 to the present, 185,000 completed training courses in New Jersey, at a cost of $6,750,000, or about $37 per person on the average. The per student cost varied with the course. Welding instruction was high, drafting low, for example.

A certain amount of products has resulted from this extensive training program. Production and education were combined. Approximately $200,000 worth of tools and equipment were made for the Army, Navy, or education.

Repair of farm equipment was taught in agricultural schools. An appreciation of farm equipment was stressed, and we hope that less will be left lying in the fields.

Due to the acute shortage of auto mechanic personnel, the armed services have asked the State Department to train civilians as instructors for assignments at several New Jersey training centers.

Industrial-arts departments are getting back to normal after the completion of the Navy plane project.

The Junior Red Cross program must be continued. There is increasing need for lap boards and similar projects for use in rehabilitation centers.

There is a need for more industrial arts in the upper grades of the High School, as a training for living in a community.

Mr. Henry E. Abt, director, Group Relations Department, National Association of Manufacturers said that he was educated in the era when capacity for reasoning, articulation, and a so-called general cultural competence were considered the height of educational opportunity, and wished that he also had learned to use his hands. In these days particularly, the white collar, once the height of respectability, is rapidly becoming the badge of the underprivileged.

Businessmen are dreaming of a world in which production will proceed at an unprecedented level, and the products of the factories will be distributed so that all men will live a better and more dignified life.

(Continued on next page)

PLANNING EQUIPMENT FOR YOUR
Electric Shop?

We'll be happy to help you! Maybe you are thinking of bringing your shop up-to-date when the procurement of materials eases up — or you may be planning a new building. In either case, no matter how small or large your needs, we can assist you.

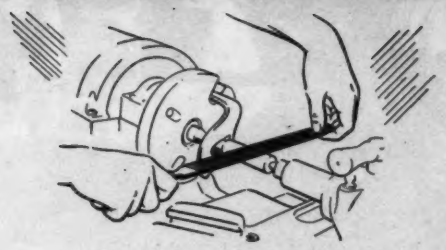
We manufacture and furnish most of the items for electric shops, such as switchboards, distribution and test panels, motor generators, transformers, etc.

Through our Standard Electric Time field engineers we will study your needs and submit layouts to meet your budget. We have rendered this service for years all over the country, so let us help you — no obligation. Drop a line to our home office and we will see that one of our men near by contacts you.

(Please refer to this magazine in answering)

THE STANDARD ELECTRIC TIME CO., SPRINGFIELD 2, MASS.
• Founded 1884 •

Filing Hints To Meet Your Needs



Lathe Filing

Widely used in industry for fitting and finishing shafts, lathe filing is an operation in which the file is stroked against the work while it revolves in a lathe. Lathe filing is commonly employed to correct the slight taper that sometimes results where the lathe cutting tool has been improperly ground or set for the wrong lathe speed or feed.

First,—select a Mill File. Or, if available, use a Long Angle Lathe File. Hold the file at a slight angle as shown in the illustration—with the work revolving towards the operator. Use a long forward steady stroke, moving laterally about half the width of the file on each stroke.

Beginners should be careful not to hold the file rigid or stationary, but to keep stroking continually.

NUCUT "Wavy Tooth" construction is a patented combination of coarse teeth and fine teeth that makes possible clean, deep, true cutting and also smooth finishing, both at the same stroke.

Awarded to the Newcomerstown, Ohio, Plant

HELLER BROTHERS COMPANY
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Good Tools since 1856

HELLER NUCUT FILES
WAVY TEETH

The officers who had prepared the program were: president, John A Whitesel, and secretary, Herbert G. Richter, Bloom Junior High School, Cincinnati, Ohio.

The following were elected for the coming year: chairman, David Wheery of Cincinnati; and secretary, William A. Yaekle of Miami University, Oxford, Ohio.

♦ The East Texas Vocational and Industrial Arts Association met November 6, 1944, in the Longview High School Shop, with Mr. H. C. Kennedy. After a delicious chicken barbecue prepared by Messrs. Kennedy and C. M. Darber of the Pine Tree School, the teachers gathered in the high school shop for their business meeting and program. Under new business the New London Shop teachers invited the members to meet with them at the next regular meeting in December, which was accepted.

The program under the direction of Mr. Kennedy discussed the topic "What May We Expect of Postwar Industrial Arts?" The twelve objectives for industrial arts as expressed on page 12 of the "A.V.A. Standards of Attainment in Industrial Arts," were discussed in their relation to the postwar period. Also, such changes in industrial arts subject matter, methods and vocational content as should become a part of our thinking in any kind of postwar planning were discussed briefly. Mr. Curd of Kilgore gave a very timely discussion on a bill before the House of the United States Congress on federal subsidy as it applies to industrial arts and requested each teacher present to get a copy of the bill and do what he could to get it passed.

At the close of the program those present were given the opportunity to see the Longview shop's display of school projects.

♦ Los Angeles Printing Teachers Association has elected Dr. Frederic J. Brudi, instructor in printing, Berendo Junior High School, Los Angeles, Calif., as president.

The other officers are: Galen T. Pearson, vice-president; Francis C. Lofthouse, secretary; and Philip E. Barrow, treasurer.

♦ The Missouri State Industrial Arts Association, which is now affiliated with the Missouri Vocational Association, held their regular annual meeting during the Missouri State Teachers Association Convention, November 3, 1944, in Kansas City. The Industrial Arts meeting was held in the ballroom of the Continental Hotel with one hundred members present.

The following officers were elected: president, Donald N. Valk, Missouri State Teachers College, Maryville, Mo.; vice-president, Mrs. Ralph Doty, Jarret Junior High School, Springfield, Mo.; secretary-treasurer, Mr. Doyle Kemper, State Supervisor of Industrial Arts, State Department of Public Schools, Jefferson City, Mo.

The office of state supervisor of industrial arts is newly created with Doyle Kemper appointed as supervisor. An immediate effort is to be made to increase the membership of the state association. — *Donald N. Valk.*

News Notes

♦ A four-hour "Victory Shift" for high school boys was established September 1, 1944, by the Allis-Chalmers Mfg. Co., Milwaukee, Wis. The afterschool shift runs from 4:20 to 8:20 p.m.

This victory shift has been in operation since the school term began, a long enough interval to permit compiling definite statistics on the 300 high school students who man it.

The company has not yet found it necessary to invoke its strict policy of immediately releasing any boy whose studies in school are regarded as unsatisfactory. This fact says much for the boys who have decided to make the war, as well as school, their business.

A cross-section survey shows that student workers in most cases find study periods at school adequate for preparation of the next day's lessons, leaving little studying to be done after work.

No student reported an average of less than

(Continued on page 28A)

(Continued from previous page)

The sudden dramatic events of our history have caused all the people to look with profound thankfulness on an industrial system which in a few months, and sometimes weeks or days, could outproduce the axis nations who had years to do their job.

There is a need for the revival of the old American attitude toward the dignity of work. Regardless of whether it is manual or intellectual, the war experience itself has created a good foundation for the achievement of this objective.

The placement of young people in the occupations for which they are best fitted is one of the great areas of possible education — industry cooperation. Suddenly, industry is sorting the extroverts from the introverts, and is checking temperament, dexterity, logic, and innumerable other aspects of aptitude, as well as the good old I.Q.

♦ The Industrial Arts Section of the Southwestern Ohio Teachers Association was held in connection with a luncheon at 12:30 p.m., October 27, 1944, at Cincinnati, Ohio.

The theme of the program was "Industrial Arts After the War."

John A. Whitesel, sectional chairman, Miami University, Oxford, Ohio, presided at the meeting.

George H. Reavis, assistant superintendent of Schools, Cincinnati, extended the greetings of the shop teachers of Cincinnati to the visitors.

Robert W. Edmiston, chairman, Division of Practical Arts, Miami University, Oxford, discussed "New Aims and Objectives in Education"; and Edward S. Maclin, West Virginia Institute of Technology, Montgomery, W. Va., spoke on "The Challenge to Industrial Arts."

What Do You Need

To Help Them Help Themselves to Bigger Opportunities in a Better America under the G. I. PROGRAM?

Properly training returning men and women for peacetime pursuits is no small job for any school—even with all the machines, equipment, and supplies it needs. But, attempting it with less than that is unfair not only to the students, but the reputation of the school as well. So, decide right now what your school needs to do its training job right—the B-G catalog will help you— then order all the things you need at one time.

An Opportunity to Help Your School, Too

If your school hasn't a training department, or the present one has "growin' pains"—here is your opportunity to do something about it, with Uncle Sam's blessing. Our planning experts are at your service. Write us today.

BRODHEAD-GARRETT CO.

"Supplying Defense Training Needs to Schools in All 48 States"

CLEVELAND, OHIO

NEWS NOTES

(Continued from page 26A)

eight hours sleep per night, with the tendency toward nine. With few exceptions, students carried a light lunch to be eaten at work and ate dinner later when they returned to their homes.

♦ School children in Spokane, Wash., will continue to enjoy a high standard of education even though there's a war on. By virtue of a government priority allotment, J. M. Tewinkel, assistant superintendent of Spokane's public schools, recently accepted delivery on eight brand new Filmosound motion picture projection outfits for use in the city's visual education program.

Through the combined foresight of the equipment manufacturers — most of whose efforts currently are devoted to vital war work — and the W.P.B. — whose officials realize keenly the necessity of allotting equipment to educational activities — American youth today is enjoying the

(Continued on page 32A)

Shop Equipment News

New Products — Publications

NEW SOUTH BEND 9-INCH TOOLROOM LATHE

A new 9-in. toolroom lathe has just been announced by the South Bend Lathe Works. This lathe has a 9¼ in. swing and takes 22 in. between centers. It has a maximum collet capacity of ½ in., and a ¾ in. spindle bore.

The 12 spindle speeds range from 41 to 1270 r.p.m., with back-gear drive for the lower speeds. A quick change gear box permits cutting 48 pitches of screw threads, 4 to 224 per inch; and provides 48 power longitudinal feeds and power cross feeds.

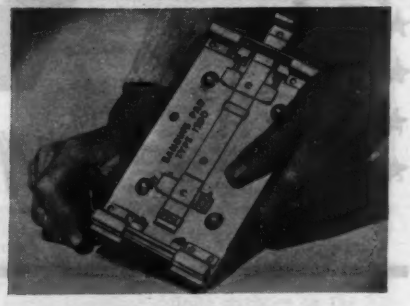
9-in. toolroom lathe

The lathe is equipped with a handwheel draw-in collet attachment, collet rack, taper attachment, thread dial indicator, thread cutting stop, large and small face plates, and micrometer carriage stop.

Complete information on this lathe may be obtained by writing to the South Bend Lathe Works, 183 E. Madison St., South Bend 22, Ind.

ELECTRIC SANDER SPEEDS UP MAINTENANCE WORK

The Sterling 1000 Portable Electric Sander quickly produces extra-smooth surfaces on wood, metal, plastics, or composition. It sands, laps, or polishes, and is excellent for blackboard sanding. It may be used to remove the edge lap where two blackboards come together, so that the two boards form one large, smooth board.



Portable sander and pad

In most cases, the blackboard slates will match reasonably well, and it is only necessary to remove a little slate on both boards to bring them down to a perfect match. However, there are cases where one board extended fully 1/16 in. more than the other. In such cases No. 30 grit open aluminum oxide paper is used to reduce most of the projecting slate; then as a final operation, both boards are worked down together with No. 150 grit open aluminum oxide paper.

(Continued on page 30A)

Sheldon

LABORATORY AND VOCATIONAL Furniture

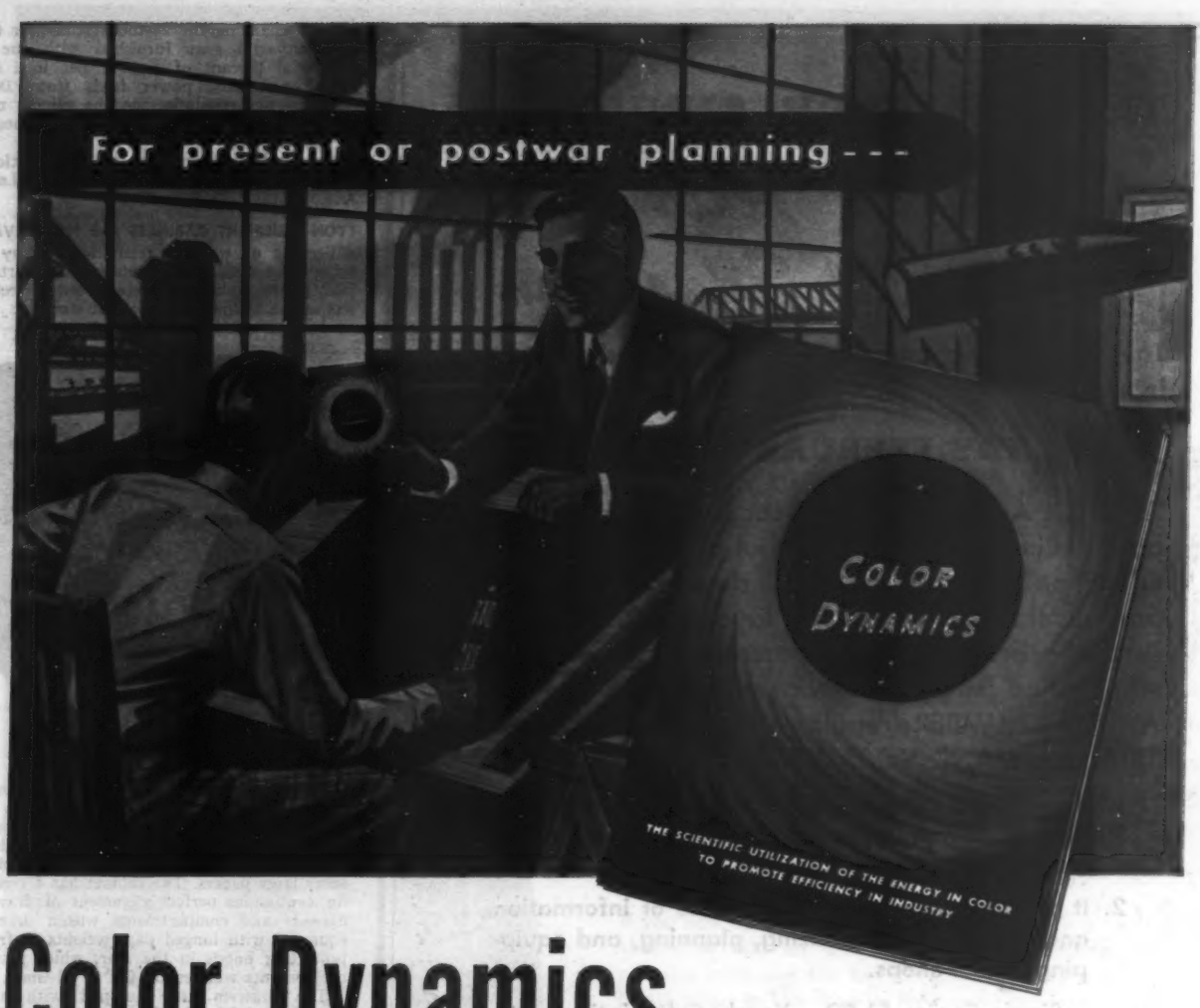
TIME TESTED . . .

Almost a half century of craft experience and user satisfaction confirms the outstanding excellence of SHELDON products . . . an excellence attested by the nation's leading schools, colleges, universities, hospitals and scientific departments of industrial plants. Continuous research and postwar planning add to the value.

Experienced SHELDON planning engineers are available, without obligation on your part, to help you prepare room layouts, compile budgets and

E. H. SHELDON & COMPANY

MUSKEGON, MICHIGAN


For present or postwar planning - - -
COLOR DYNAMICS
THE SCIENTIFIC UTILIZATION OF THE ENERGY IN COLOR TO PROMOTE EFFICIENCY IN INDUSTRY

Color Dynamics...

Tomorrow's better shopmen will know how this revolutionary new science improves quality of production if you start teaching it—today!

EDUCATORS in many of the country's leading vocational and industrial schools now teach Pittsburgh's revolutionary new science of COLOR DYNAMICS!

Its principles have already been applied in many industries.

As rapidly as they change over to peace-time production, numerous other plants will use them.

Shop executives are becoming increasingly aware that eye fatigue slows down a worker more than physical fatigue. It causes headaches, digestive upsets, "nerves," depression. These lead to poorer production and absenteeism.

COLOR DYNAMICS correct such eye fatigue. It cuts down unnecessary eye travel, reduces tension and the need for the worker to keep adjusting his vision continuously.

Better shopmen everywhere are becoming familiar with this system and how it improves working conditions and quality of output.

We suggest the advisability of including this new science in your shop courses.

Write today for a free copy of our book, COLOR DYNAMICS. It contains a comprehensive explanation of this new method of utilizing color-energy in industry. Address Pittsburgh Plate Glass Company, Paint Division, Dept. IV-1, Pittsburgh 22, Pennsylvania.

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Industrial Arts and Vocational Education

The authoritative source of information and guidance in organizing, planning, and equipping school shops.

READY FEBRUARY 15, 1945

The SHOP ANNUAL NUMBER summarizes the periodic progress in the field of industrial arts and vocational education, emphasizes the new developments ahead, presents through actual shop layouts and equipment lists, the best methods of accomplishment in the school shop field. The service of the SCHOOL SHOP ANNUAL NUMBER (regular March issue) of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is

1. **It renders a comprehensive service promoting the introduction, progress, and expansion of industrial arts and vocational education.**
2. **It provides an authoritative source of information and guidance in organizing, planning, and equipping school shops.**

Single Copies $1.00 — Yearly Subscription, including Shop Annual Number, $2.50

THE BRUCE PUBLISHING COMPANY
Publishers
145 Montgomery Bldg., Milwaukee 1, Wis.
NEW YORK **CHICAGO**

(Continued from page 28A)

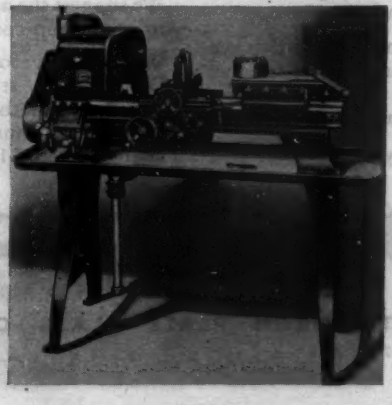
For further information address Sterling Tool Products Co., 155 — G East Ohio St., Chicago 11, Ill.

LOGAN QUICK CHANGE GEAR TURRET LATHE

The Logan No. 840 Quick Change Gear Turret Lathe is a production machine which handles bar stock up to and including 5/8 in. diameter. It has a precision preloaded ball bearing spindle mounting; adjustable gibs to compensate for wear of turret and cross slide; and self lubricating bronze bearings protecting 35 vital points in the lathe.

The bedways are ground to within .0005 in. of absolute accuracy, total run out of headstock spindle 12 in. from the bearing is less than .001 in.; the lead screw is held to within .002 in. in 12 in.; and the turret holes are bored from the headstock.

The quick change gear box provides 48 threads and feeds in either direction to the carriage. Simple adjustments of two levers make screw threads of from 8 to 224 inch quickly available, and by changing the 24-tooth stud gear for the 40-tooth stud gear furnished with the lathe, additional threads of 4 to 7 per inch can be cut. Longitudinal power feeds from .0015 to .1000 in. per revolution on the spindle may be obtained. Power cross feeds are .25 times longitudinal feeds.

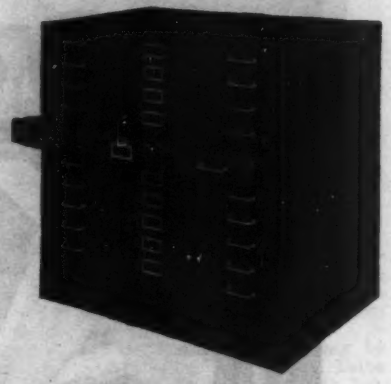


Logan quick-change gear turret lathe

For further information and specifications address Logan Engineering Co., 4901 West Lawrence Ave., Chicago 30, Ill.

LYON BLUEPRINT CABINETS ARE NOW AVAILABLE

Because of wartime restrictions, many plants using large quantities of blueprints, charts, tracings, photographs, etc., were forced to seek other less secure methods of safe, flat storage.



Blueprint cabinet

Now Lyon steel blueprint cabinets for industrial requirements again are available.

The Lyon blueprint cabinet is especially designed for safe, flat storage of valuable drawings, tracings, blueprints, charts, photographs, and other large papers. The cabinet has a rigid frame for continuous perfect alignment of drawers. All drawers and compartments within drawers are equipped with hinged paperweights in front and protecting hoods in the rear, which insure that the contents will remain flat at all times.

The drawers are equipped with attractive handles and label holders, and can be divided in many different ways. Partitions are standardized and interchangeable.

For complete details write for catalog No. 331 to Lyon Metal Products, Inc., Aurora, Ill.

NEW 5-INCH POCKET SLIDE RULE

The Bruning No. 2401, 5-in. pocket slide rule, is made of plastics, so that all sticking or binding due to atmospheric condition is eliminated. Its graduations are molded in so that they will never lose their visibility, and the tension on the slide can be adjusted to the owner's taste by means of three screws.

The indicator-glass frame is made of stainless steel, sturdy enough to eliminate wobble. New glasses can be inserted easily if that becomes necessary.

The Charles Bruning Co., Inc., 4700 Montrose Ave., Chicago 41, Ill., will gladly send descriptive folder on this slide rule to anyone desiring it.

STANLEY ACQUIRES OLD FIRM

The Stanley Works announces that it has bought the business of The Russell Jennings Mfg. Co., of Chester, Conn., and this business will be operated as a department of Stanley Tools.

Manufacturing operations will continue at the Chester plant where the business has been located for some ninety years, and for the time being, all shipments will be made from that plant.

Sales will be handled by the regular salesmen of Stanley Tools. All correspondence regarding orders now placed with The Russell Jennings Mfg. Co., and any new orders should be addressed as in the past to The Russell Jennings Mfg. Co., Chester, Conn. Eventually a stock of auger bits will be carried in New Britain, and shipments combined with other Stanley Tools, but that is many months away.

(Continued on page 32A)

DoALL Does 8-HOUR JOB in ½ HOUR

The same blanking die that takes 8 hours of tedious drilling and filing to make on the Drill, can be cut by the DoALL in exactly 30 minutes. Not only a 16 to 1 saving in time, but no broken drills, no lost metal.

TRY IT YOURSELF...

If you now use a drill for work of this kind—or a vertical shaper or mill, for that matter—make your own comparative tests and see for yourself how many short cuts DoALL offers in tool room or for regular production work.

If you do not have a DoALL in your plant, one of our factory-trained men will gladly call with a mobile demonstrating unit.

DoALL is today's fastest internal and external method for cutting all metals, alloys, plastics, laminates, wood—blocks a foot thick, bar stock, tubing or stacked sheets.

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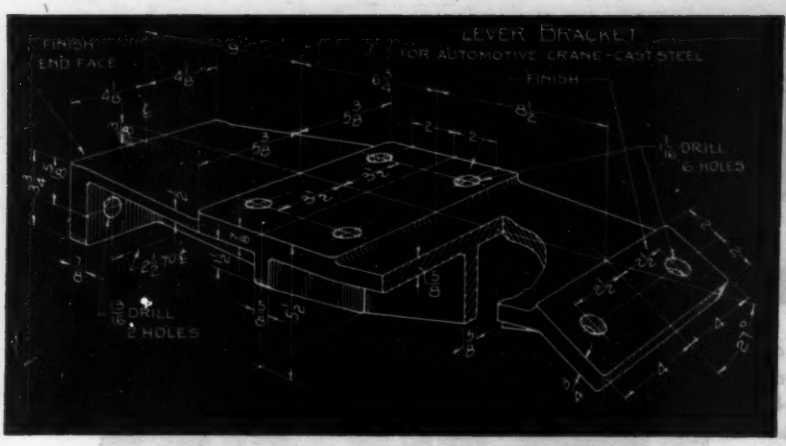

HERE'S A LEVER TO HELP RAISE THE SKILL OF YOUR "P. I. T.s"

Drawing the correct orthographic views of this Lever Bracket will give your Pre-Induction Trainees a good workout and help them to learn a skill they'll need in the Service—blueprint reading.

Give them a sound, practical lesson in working tools, too! Start them off with the Typhonite Eldorado pencil for their working drawings. It's a brilliant performer—makes sharp, clear lines, responds smoothly, stands up under pressure and makes drawings which translate into perfect blueprints. Eldorado will be right-hand man to your students all through their professional lives.

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SOLUTION: We will send you a free blueprint showing the solution of this problem. Write to the address below within thirty days. Specify Blueprint No. 128-J1.

SCHOOL BUREAU, PENCIL SALES DEPT., JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY 3, N. J.

(Continued from page 30A)

It will be the constant aim of Stanley Tools to maintain the same high quality that has been the characteristic of the Russell Jennings brand.

APPOINT EASTERN SALES MANAGER

Silver Burdett Co., 45 East 17th St., New York 3, N. Y., announces the appointment of G. Dan Robison, Jr., as Eastern Sales Manager with headquarters in the New York Office. Mr. Robison has been sales representative in Tennessee for the past nine years, with sales responsibilities also in several neighboring states.

ENLARGE PLANT

The Pittsburgh Plate Glass Company will erect a new paint plant at Springdale, a suburb of Pittsburgh, Pa. Earlier this year the company announced the completion of the company-operated chemical plant at Natrium, W. Va. It also has under construction a $350,000 addition to its glass plant at Creighton, Pa.

The new paint plant will be located on a 14-acre tract recently purchased, and construction will begin as soon as materials and equipment are available. The company also has paint factories located at Dayton, Detroit, Portland, Los Angeles, and Houston.

ARMY-NAVY E AWARDS

The coveted Army-Navy E Award has been received by the American Type Founders, Inc., of Elizabeth, N. J., and by the Goodyear Tire and Rubber Co., of Alabama, Gadsden, Ala.

The DeVilbiss Co., Toledo, Ohio, have received the Army-Navy Production award for the third time.

LYMAN H. BELLOWS TO SHELDON

The Sheldon Machine Co., Inc., manufacturers of Sheldon precision lathes and Vernon milling machines and shapers, announce the appointment of Mr. Lyman H. Bellows as the sales manager at Sheldon. Mr. Bellows is now setting up the postwar organization for distributing Sheldon lathes and their newly acquired Vernon lines.

J. W. SULLIVAN

J. W. Sullivan, Chairman of the Board of Skilsaw, Inc., died October 26 at his home in Evanston, Ill. Mr. Sullivan was 73 years old. In May, of this year, he and Mrs. Sullivan celebrated their golden wedding anniversary.

Mr. Sullivan was the founder of Skilsaw, Inc., portable electric tool manufacturers. His first major sales success was in supplying Skilsaws to construction companies who built the Amerman Furniture Mart and Chicago's Wacker Drive.

Mr. Sullivan became president of Skilsaw, Inc., in 1926 and was elected chairman of the board in 1942 when his son, Bolton Sullivan, was appointed president of the company. Throughout the existence of the firm, he contributed much toward employer-employee relations.

DEVILBISS MOVES CINCINNATI OFFICE

The DeVilbiss Company announces the removal of its Cincinnati District Sales Headquarters to 410 American Bldg., Central Parkway and Walnut Street.

HELPFUL PRINT SHOP PLANNING AIDS

The American Type Founders, 200 Elmora Ave., Elizabeth B, N. J., issue a number of four to eight-page leaflets presenting blueprint layouts of print shops, lists of needed equipment, and helpful hints for teachers, school executives, and architects confronted with the task of planning graphic-arts programs for the school. Nos. 6-J, 12-J, 15-J, 20-J, and 24-J show graphic-arts units for junior high schools, class sizes varying from 6 to 10 student, to 24 to 30 student capacity.

No. 25-V leaflet presents the layout of a vocational graphic-arts unit for trade training classes accommodating 25 to 30 students.

NEWS NOTES

(Continued from page 28A)

most well-rounded learning facilities in the nation's history.

♦ W. F. Currier, director of vocational education at Coffeyville, Kans., reports the opening of a class in arc welding and two machine-shop classes for training men who will thus be able to shift from assembly and other types of work to the machine shop when the industrial firms will engage in different types of manufacturing following the war.

♦ Supt. A. W. Glad and J. Rufus Gray, director of vocational education, announce that eight evening classes have been organized for the civilian and military workers in the offices and shops of the Pratt Army Air Field at Pratt, Kans. The courses include aircraft physics, blueprint reading, accounting, shorthand, and typewriting.

♦ Continuing its program of formulating training standards for welding operators, the American Welding Society has published "Part B-1—Oxyacetylene Welding of Steel Aircraft" of the "Code of Minimum Requirements for Instruction of Welding Operators."

Two courses are established, one primary, the other advanced, with welding exercises and lectures in related welding information prescribed for each. Successful completion of a course by a trainee should enable him to pass qualification tests such as those required for Class A and Class B Army and Navy aircraft welding operators.

Copies of the standard may be obtained from the American Welding Society, 33 West 39th St., New York 18, N. Y., at a price of 50 cents per copy with special discounts for group quantities.

♦ Students, school counselors, veterans, war-workers, and others interested in postwar jobs may find helpful information in three new six-page leaflets, on Public Health Nursing, Book Illustration, Occupations in Television, and Real Estate published by Occupational Index, Inc., New York University, New York 3, N. Y., at 25 cents each.

Each leaflet covers postwar employment prospects, the nature of the work, abilities and training required, earnings, advancement, advantages, and disadvantages of the occupation.

♦ More than 75,000 disabled men and women have been returned to the 1944 pay rolls as a result of the assistance given them under the Federal-State rehabilitation program.

5400 HOURS OF CREATIVE ENTERTAINMENT*

*Certified by New York Testing Laboratories

Here's a library of 4 Higgins Art Books guaranteed to give hours of creative entertainment to professionals and students alike. Drop in and thumb through these valuable books at your nearest Higgins Ink dealer...and see for yourself what a buy they are!

Display cabinet free with assortment of 4 titles.

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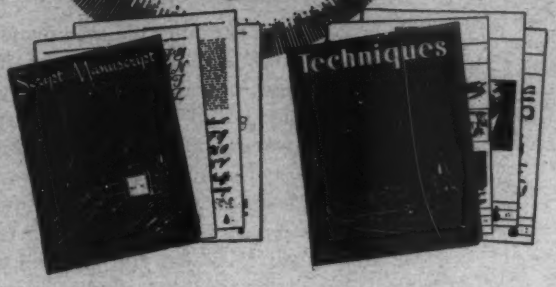

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TECHNIQUES: 37 pages... well over 100 illustrations. Gives you the ground work and advanced techniques for all types of Higgins Ink drawing.....Each 50¢

CARTOONING: How professional cartoonists "get that way"—60 wonderfully illustrated pages of techniques used by America's top flight comic strip, gag, and political cartoonists. Also a chapter on the theory of humor. Each $1.00

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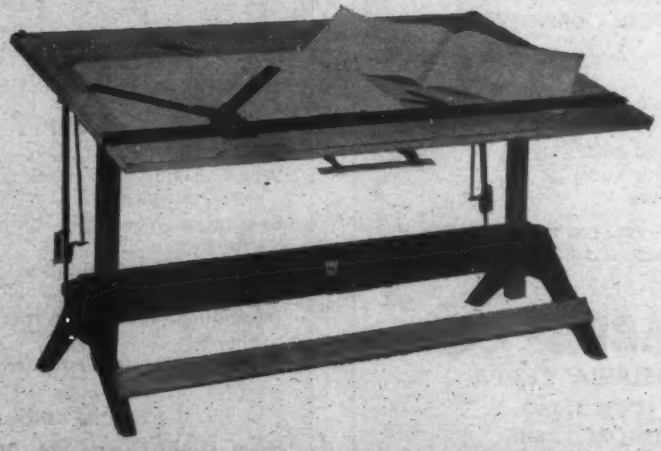

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DEALERS will profit by window displays of ESCO Products—Write for our NEW 4-colored die cut DISPLAY CARD Size 14 x 22

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It pays to buy an Oliver

Here is the ideal small surface planer. It is very safe — very rigid—and extremely easy to operate. It is the Oliver No. 399 Single Surface Planer. A money saver.

This, as well as any of the "OLIVER" Junior machines listed here, are money savers and pay for themselves in short order.

Band Saw	Jointer	Surface Planer
Boring Machine	Speed Lathe	Belt Sander
Saw Bench	Mortiser	Shaper

Oliver Builds with Precision and Care.

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Grand Rapids 2, Mich., U.S.A.

Tested for appeal and practical value—

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WOODWORKING PROJECTS for INDUSTRIAL ARTS STUDENTS

25 original and carefully planned projects, especially suitable for the junior high school grades, but usable in a variety of situations, including rehabilitation training. Wide range of subjects—adaptable designs—drawing a part of the shopwork. All projects are so presented as to stimulate the interest of students and to encourage their initiative and planned ability. Only hand tools are needed to carry out the projects. $1.40

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CATALOGUE VOL. 700 TO SCHOOLS AND TEACHERS, ON REQUEST

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For the General Shop

GENERAL SHOP HANDBOOK
Willoughby and Chamberlain

A famous, economical text covering a complete general course, now thoroughly revised and enlarged for use in general shops. New unit on Rope Tying and additional material in Metalwork and Finishing. Many other additions and expansions of long-tested units on Drawing, Plumbing and Pipe Fitting, Concrete Work, Electrical Work, Tool Sharpening and Reconditioning, and Glazing. Paper cover, 92 cents.

111 Projects for the General Shop Derwellis	$2.50
General Electrical Work Willoughby	.56
Woodworking Workbook Nichols and Stiles	.56
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Ask for GENERAL SHOP Circular

THE MANUAL ARTS PRESS, Peoria 3, Illinois

365 BIG DATES FOR A DOLLAR!

EXTREME LEGIBILITY—Each numeral 2¼" high—that's the feature of this beautiful new six-color POST 1945 Calendar—overall size 17" x 25". Each date of the week is designed to be legible from any spot in the drafting room. The entire current month with ultimate and proximate months appear on each weekly page. The calendar is in full, brilliant color and includes a section devoted to significant drafting room data, covering charts on wire and sheet metal gages, screw threads, bolt heads, pipe and pipe fittings, gears, metric equivalent, and complete twelve-month calendar. Price $1.00.

The FREDERICK POST COMPANY • Box 803 • Chicago 90, Illinois

Attached find $1.00 for a Giant 1945 Post Wall Calendar.

NAME_____ SCHOOL_____

ADDRESS_____ CITY & STATE_____

Detroit Public Library

New Publications

Forbur Project Patterns

By J. L. Forcum and Nelson L. Burbank. Published by Nelson L. Burbank, 5735 Wintrop Ave., Cincinnati 24, Ohio. Price per sheet, 50 cents.

These patterns are printed full size so that all the student or homecrafter needs to do is to cut out the pattern and mark it on his material, after which he is ready to finish the cutting or machining without doing any further measuring.

The patterns may also be transferred by means of carbon paper.

At times several of the projects are printed on the 25 by 38-in. sheet which is the standard size in which these patterns are published.

Patterns No. 1, cookie server, and No. 2, kitchen knife holder, for instance, appear together on one sheet. Likewise, patterns No. 6, bathroom stool, and No. 7, towel rack.

How to Plan a House

By Gilbert Townsend and J. Ralph Dalzell. Cloth, 525 pages, 5¾ by 8½ in., illustrated. Published by American Technical Society, Chicago, Ill.

An excellent book covering types of architecture; choosing the site; locating the building on the lot; foundations; walls, floors, partitions, and roofs; planning the rooms, floor plans, and elevations; keeping within the financial budget; plumbing; electrical work; heating; and making out the specification.

The book is designed for the carpenter and builder, the real estate dealer, and for those who want to plan their own homes.

Training for Safety

Bulletin No. 279 copyrighted by the State Board of Control for Vocational Education, Lansing, Mich. Paper bound, 6⅜ by 9 in., illustrated.

This is a well worked out program for school shops, and instructors of industrial arts and vocational education can profit greatly by a perusal of it.

Practical Electrical Wiring

By H. P. Richter. Cloth, 521 pages, 5¾ by 8¼ in., illustrated. Price, $3.50. McGraw-Hill Book Co., New York City.

The second edition of this book which, based on the 1940 national electrical code, explains clearly to student and artisan alike the how and why of problems arising in the wiring of structures at voltages under 600 volts.

The wiring of both residential and nonresidential structures are discussed in the book.

Machines

By Charles R. Wallendorf, Frank Stewart, George Luedeke, and Dominic M. Chiarello. Cloth, 300 pages, 6½ by 9½ in., illustrated. Price, $1.24. American Book Co., New York, N. Y.

A lucid explanation of the physical laws as applied in many of the machines with the working of which the student is more or less familiar.

There are 14 chapters. In them are discussed: simple machines, hydraulic machines, friction, power and power transmission, molecules, force, heat, measurements in temperature and heat, expansion due to heat, changes in state of matter, heat engines, transfer of heat, fuel, and applications of physical principles in the automobile engine.

An Outline of the Home Furnishing Periods

By H. P. Osborne. Cloth, 168 pages, 7 by 9¾ in. Price, $3. Outline Publishing Co., Long Beach, Calif.

This is the third revised and enlarged edition of a very useful book for those studying about or working in the furniture field.

While the material is given in outline form, it is quite comprehensive. This, together with the many good illustrations, makes the book very worth while.

The book also contains a glossary.

Simplified Time Study

By Herbert J. Myers. Cloth, 140 pages, 5¾ by 8⅜ in., illustrated. Price, $2.50. The Ronald Press Co., New York City.

A common-sense approach to the subject of time studies for factory supervisors, shop stewards, time keepers, and cost men.

The Industrial Supervisor

By John M. Amiss and Traver C. Sutton. Cloth, 243 pages, 5½ by 8⅛ in. Price, $3. The Ronald Press Co., New York, N. Y.

A very thorough treatment of the subject, bringing out the qualifications needed by the supervisor, his responsibilities, how he can get cooperation and maintain discipline and morale, promote safety, make time studies, reduce labor turnover, and be fair at all times to both labor and employer.

Principles of Aircraft Engines

By Bert A. Shields. Cloth, 378 pages, 5⅞ by 8¼ in., illustrated. Price, $1.88. The McGraw-Hill Book Co., New York City.

A textbook on aircraft power plants, carburetion, ignition systems, methods of lubrication, engine instruments, engine operation and servicing, written in nontechnical language for secondary school students. The material is well illustrated and presents a very good background for that nonglamorous hero of the airfield—the airplane mechanic.

Automotive Mechanics—II

By Clarence G. Barger. Cloth, 336 pages, 6½ by 9½ in., illustrated. Price, $1.24. American Book Co., New York, N. Y.

A text belonging to the PIT series. It is designed to meet the requirements of a second semester course in automotive mechanics, and covers the study of the fuel system, electrical system, lubrication, and safety observances with which those who drive the automobile should be fully conversant.

Aerodynamics

By Leslie R. Parkinson. Cloth, 112 pages, 5¾ by 8⅜ in., illustrated. Price, $2.25. The Macmillan Co., New York City.

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(Continued on page 37A)

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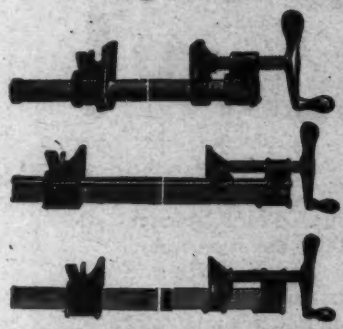

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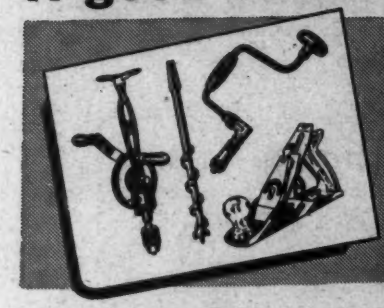

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(Continued from page 35A)

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By M. N. Beitman. Paper, 16 pages, 5⅜ by 8¼ in., illustrated. Price, 10 cents. Supreme Publications, Chicago, Ill.

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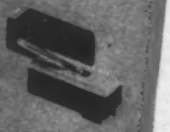
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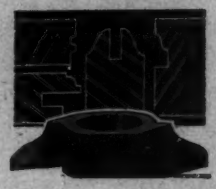

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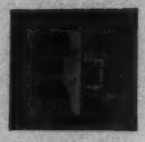

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Index To Advertisements

Adjustable Clamp Company 36A
American Gas Furnace Co. 38A
American Technical Society 17A
Ames Company, B. C. 4A
Armstrong Bros. Tool Co. 8A
Atkins and Company, E. C. 17A
Atlas Press Company, The 3A
Badger-American Electrotype Co. 38A
Baldor Electric Company 36A
Black & Decker Mfg. Co. 13A
Brodhead-Garrett Co. 27A
Bruce Publishing Company, The ..... 3rd cover
Burrill Saw & Tool Works 12A
Campbell Co., M. L. 16A
Carmen-Bronson Company 38A
Carter Company, R. L. 24A
Chicago Wheel & Mfg. Co. 39A
Cincinnati Tool Company, The 12A
Columbian Vise & Mfg. Co. 14A
Concord Radio Corp. 37A
Continental Machines, Inc. 31A
Craftsman Supply House 39A
Delta Mfg. Company ..... Insert between 8A-11A
Dietzgen Company, Eugene ..... 2nd cover
Dixon Crucible Co., Joseph 32A
Driscoll & Co., Martin 39A
Elcraft Div. Educational Laboratories 39A
Engineering Sales Company 33A
Famco Machine Co. 16A
Fellowcrafters, Inc. 37A
Foley Lumber Company, T. A. 38A
Greenlee Tool Co. 24A
Guillow, Paul K. 36A
Hammett Company, J. L. 38A
Heller Bros. Company 26A
Higgins Ink Co., Inc. 33A
Hobart Brothers Company 39A
Indianhead Archery & Mfg. Co. 38A
LeBlond Machine Tool Co., R. K. ..... 4th cover
LePage's, Inc. 36A
Lewis Machine Tool Co. 16A
Lufkin Rule Company 14A
Lussky, White and Coolidge 36A
Manual Arts Press 34A
McGraw-Hill Book Co., Inc. 34A
Metal Crafts Supply Co. 38A
Millers Falls Company 36A
Morgan Vise Company 16A
Motor 11A
Mummert-Dixon Co. 38A
Nicholson File Company 18A
North Brothers Mfg. Co. 12A
Oliver Machinery Co. 34A
O'Neil-Irwin Mfg. Company 6A
Osborn Bros. 38A
Paasche Airbrush Co. 17A
Paxton Lumber Co., Frank 38A
Pittsburgh Plate Glass Co. 29A
Porter-Cable Machine Co. 7A
Post Company, Frederick 35A
Reading Electric Company 38A
Russell Electric Company 38A
Sheldon & Co., E. H. 28A
Sheldon Machine Co., Inc. 15A
Silver Burdett Company 24A
Simmons-Boardman Publ. Corp. 8A
Snap-On Tools, Inc. 8A
South Bend Lathe Works 1A
Standard Electric Time Co. 25A
Stanley Electric Tool Div. 6A
Stanley Tools 14A
Starrett Co., L. S. 22A
Sta-Warm Electric Co. 38A
Sterling Wheelbarrow Co. 39A
Stokes Industries 23A
Tannewitz Works, The 4A
Tegge Lumber Co., The 38A
Thordarson Elec. Mfg. Co. 36A
Turner Brass Works, The 38A
Union Carbide and Carbon Corp. 2A
Victor Animatograph Corp. 21A
Walker-Turner Co., Inc. 5A
Wallace Company, J. D. 6A
Weber Company, F. 34A
Weidenhoff, Inc., Joseph 11A
Whiffen Co., Inc., L. C. 38A
Whiting Co., E. B. & A. C. 38A
Whittier Plastic Company 39A
Williams and Co., J. H. 4A
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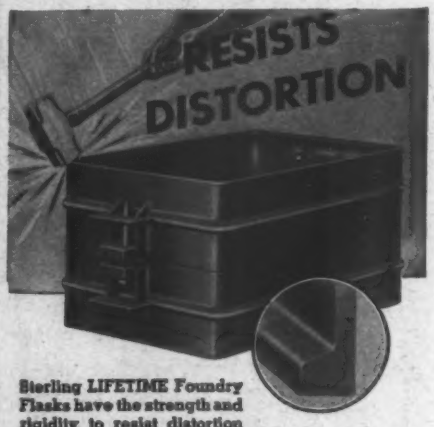

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